Camden Infrastructure Study: Utilities and Physical Infrastructure Needs Assessment

Prepared for: *London* Borough of Camden

Prepared by:

URS Corporation Limited and Integrated Services and Utilities (ISU) Limited

49353216

October 2009

Camden Infrastructure and CIL Study

Utilities and Physical Infrastructure Needs Assessment

October 2009

Project Title: Camden Infrastructure and CIL Study

Report Title: Physical and Utilities Infrastructure Needs Assessment

Project No: 49353216

Report Ref:

Status: Version for Issue

Client Contact Name: David Joyce

Client Company Name: London Borough of Camden

Issued By:

Document Production / Approval Record

Issue No: 1	**Name**	**Signature**	**Date**	**Position**
Prepared by	Various technical contributors			
Checked by	Elena Di Biase		23/10/2009	Assistant Project Manager
Checked by	Chris Cheal		23/10/2009	Project Manager
Approved by	Adam Lubinsky		23/10/2009	Project Director

Document Revision Record

Issue No	**Date**	**Details of Revisions**
1	09/04/2008	Original issue
2	12/06/2009	Second Draft
3	03/08/2009	Final Report
4	11/09/2009	Final Report – Tracked to correspond with excel comments response sheet
5	09/10/2008	Final Report
6	23/10/2009	Version for Issue

LIMITATION

URS Corporation Limited (URS) has prepared this Report for the sole use of London Borough of Camden in accordance with the Agreement under which our services were performed. No other warranty, expressed or implied, is made as to the professional advice included in this Report or any other services provided by us. This Report may not be relied upon by any other party without the prior and express written agreement of URS. Unless otherwise stated in this Report, the assessments made assume that the sites and facilities will continue to be used for their current purpose without significant change. The conclusions and recommendations contained in this Report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from whom it has been requested. Information obtained from third parties has not been independently verified by URS, unless otherwise stated in the Report.

COPYRIGHT

CONTENTS

CONTENTS

Section **Page No**

CONTENTS

LIST OF FIGURES

Page No

LIST OF FIGURES

Page No

LIST OF TABLES

Page No

LIST OF TABLES

Page No

GLOSSARY

A&E	Accident and Emergency
AMP	Asset Management Plan
AMPC	Asset Management Plan Camden
AMS	Asset Management Strategy
BERR	Business, Enterprise and Regulatory Reform
bn	Billion
BREEAM	Building Research Establishment Environmental Assessment Method
BREW	Business Resource Efficiency and Waste
BSF	Building Schools for the Future
BT	British Telecommunications
CAG4	CAG Consultants
CEO	Chief Executive Officer
CfSH	Code for Sustainable Homes
CHP	Cooling Heat and Power
CIL	Community Infrastructure Study
CLG	Department of Communities and Local Government
CO2	Carbon Dioxide
COLT	City of London Telecom
CRC	Carbon Reduction Commitment
CS	Core Strategy
CSOs	Combined Sewer Outflows
DBERR	Department for Business, Enterprise and Regulatory Reform
DCLG	Department for Communities and Local Government
DECC	Department of Energy and Climate Change
DED	Decentralised Energy Delivery Unit
DEFRA	Department of Environment Food and Rural Affairs
EA	Environment Agency
EDF	EDF Energy
EfW	Energy from Waste

EMR	EMR Ltd
ESCO	Energy Services Company
ETS	Emissions Trading Scheme
EU	European Union
FT	Foundation Trust
GARDIT	General Aquifer Research Development and Investigation Team
GLA	Greater London Authority
GPO	General Post Office
ISU	Integrated Services Utilities
IT	Information Technology
KM	Kilometres
kVA	Kilovolt-Ampere
KWh/km2	Kilo Watt hour per kilometres squared
LA	Local Authority
LAS	London Ambulance Services
LATS	Landfill Allowance Trading System
LB	London Borough
LBC	London Borough of Camden
LDA	Local Development Agency
LDF	Local Development Framework
LDZ	Local Distribution Zone
LEB	London Electricity Board
LFEPA	London Fire & Emergency Planning Authority
LPN	London Power Network
M&E	Mechanical and Electrical
m3	Cubic Metres
MAFP	Multi-Agency Flood Plan
MBT	Mechanical Biological Treatment
MET	Metropolitan Police
Ml/d	million litres per day
Ml/d	million litres per day
MPA	Metropolitan Police Authority

MRF	Materials Recycling Facility
MSW	Municipal Solid Waste
MUSCo	Multiple Utilities Services Company
MVA	Megavolt Ampere
NG	National Grid
NHS	National Health Service
NI	National Indicator
NLWA	North London Waste Authority
NW	North West
ODPM	Office of the Deputy Prime Minister
OFCOM	Office of Communications
OFGEM	Office of Gas & Electricity Markets
OFWAT	Office of Water Services
ONS	Office for National Statistics
PCSO	Police Community Support Officer
PCT	Primary Care Trust
PE	Polyethylene
PFI	Private Finance Initiative
PPP's	Public Private Partnerships
PPS	Planning Policy Statement
PRS	Pressure Reducing Stations
PTS	Patient Transport Services
RAF	Resource Allocation Formula
RCVs	Refuse Collection Vehicles
SEEB	South Eastern Electricity Board
SFRA	Strategic Flood Risk assessment
SNT	Safer Neighbourhood Teams
SPG	Supplementary Planning Guidance
SUDS	Sustainable Urban Drainage Systems
SWA	Slough, Wycombe, Aylesbury
SWMP	Surface Water Management Plans
SWOX	Swindon, North and South Oxfordshire

SWT	Sewerage Treatment Works
tpa	tonnes per annum
TW	Thames Water
UCL	University College London
UCLH	University College London Hospital
UDP	Unitary Development Plan
UK	United Kingdom
URS	URS Corporation Ltd
WRAP	Waste and Resources Action Programme
WRZ	Water Resource Zone
WSZ	Water Supply Zone
WTS	Waste Transfer Station

EXECUTIVE SUMMARY

Introduction

The emerging London Borough of Camden Local Development Framework (Camden LDF), within which the Core Strategy is the principal document, estimates that Camden's population will grow by about 15% between 2006 and 2026. The Core Strategy identifies five principal growth areas of note[1] where new residential and commercial development will be concentrated in the years leading up until 2025/6. In addition to the growth within the five principal growth areas, significant development will also take place in a more evenly distributed fashion across the rest of the borough.

A summary[2] of the anticipated scale of growth, by various measures, is given below:

ES Table 1: Projected Residential and Commercial Development Growth, Camden, 2006 – 26

	Anticipated increase by five year period and in total				
Measure	***2006-11***	***2012-16***	***2016-21***	***2021-26***	***Total***
Population	8,358	11,064	9,869	6,697	35,988
Dwellings	3,369	4,817	4,297	2,916	15,669
Office Space (m2)	46,324	163,680	202,408	202,408	614,820
Retail Space (m2)	6,620	14,782	15,282	10,282	46,965
Leisure Space (m2)	6,836	24,001	29,665	29,665	90,166

Source: Based on joint analysis by London Borough of Camden and URS Corporation.

This growth will result in increased demands being placed upon Camden's infrastructure. PPS12 (2008)[3] directs that core strategies should be supported by evidence of what physical, social and green infrastructure is needed to enable the amount of development proposed for the area, taking account of the type of development and its distribution. It further states that such evidence should also cover who will provide the infrastructure and when it will be provided.

In accordance with the guidance given by PPS12, the London Borough of Camden have commissioned an infrastructure study led by URS Corporation, together with Steer Davies Gleave, Integrated Services and Utilities Limited, Montague Evans and Davis Langdon.

This technical report covers utilities and physical infrastructure, and where possible sets out conclusions for the infrastructure requirements in association with the growth levels set down in Camden's emerging *Core Strategy*.

[1] These are, as set out in The Mayor's *London Plan*, the Opportunity Areas located at Kings Cross, Euston and Tottenham Court Road and the Areas for Intensification located at Holborn and the West Hampstead Interchange.

[2] Further detail and a full explanation of the assumptions underpinning these figures is provided in the *Camden Infrastructure Study – Main Report* document, which accompanies this report.

[3] Department for Communities and Local Government (2008), *Planning Policy Statement 12: Local Spatial Planning*

Purpose of the Camden Infrastructure Study

The broad purposes of the study, as described in the London Borough of Camden's Brief for this commission, are:

A. To identify the infrastructure needs of the London Borough of Camden over the lifespan of the LDF (to 2025/6)

B. To help establish the relative importance of infrastructure needs

C. To prepare a strategic infrastructure plan

D. To devise a robust methodology to set a viable Community Infrastructure Levy

This *Utilities and Physical Infrastructure Needs Assessment*, and the accompanying *Transport Infrastructure Needs Assessment* and *Social Infrastructure Needs Assessment* reports, in particular respond to the first two purposes listed, and lay the groundwork for the preparation of a strategic infrastructure plan and following that, the development of a methodology for setting a Community Infrastructure Levy on development.

Key Conclusions – Infrastructure Requirements

This Technical Report has identified a number of likely strategic infrastructure requirements in terms of general utilities, foul and surface water drainage, waste management and emergency services infrastructure that can be expected to arise with an increase in population of ca. 36,000 people are as shown below in ES Table 2. In the table, a grey-shaded background denotes those schemes or requirements that have already been committed to or identified within service provider strategies, whilst an unshaded, white background denotes those schemes that are additional requirements identified by this study. For a detailed description of these requirements, together with an extensive list of recommendations for further analysis please see **Table 11-1**.

ES Table 2 – Infrastructure Requirements, by Type

Key

	Already identified by responsible agency/ provider
	Requirement identified via this study

Type	Identified Schemes / Requirements	Where & when (if applicable)	Who – Agency Responsible	Is item already identified in strategy and/or fully funded?
Water	Upgraded or renovated pumping stations and mains.	Borough wide and outside borough boundaries, pending further investigation	Thames Water	Partially: overall requirements for the whole Thames Water region identified, but no details available at the Camden level.
Energy	Primary and secondary substations	Borough wide, pending further investigation	EDF	No further details available

Type	Identified Schemes / Requirements	Where & when (if applicable)	Who – Agency Responsible	Is item already identified in strategy and/or fully funded?
	Pipes and cabling	Borough wide, pending further investigation	EDF and NG	No details available from EDF, need identified from NG but no detail on funding.
	Combined Heat and Power systems	King's Cross (2011-2016) Euston (2016-2021) Tottenham Court Road (2011-2016) Holborn (2016-2021) West Hampstead Interchange (2016-2021)	London Borough of Camden / LDA / PPP / PFI	Need identified across the growth areas. The King's Cross scheme is potentially partly addressed by s106 arrangements as part of the King's Cross Central development. The Euston scheme would build on existing LDA work on the feasibility for an area-wide CHP/district heating network for the Euston Road area. Also, CHP schemes already supply to UCL campuses in the area, Bloomsbury Heat ant Power and Gower Street Heat and Power, and there are a large number of communal heating schemes serving local authority housing estates to the north of Euston Road. Finally, it is understood that the Council will encourage the delivery of a smaller network in the north of the borough, at Gospel Oak associated with estate regeneration or at Camden Town associated with a development at Hawley Wharf.
Surface and Foul Water Drainage	Pumping stations	Borough wide, pending further investigation	Thames Water	Partially: overall requirements for the whole Thames Water region identified, but no details available at the Camden level[4].
	New and renovated sewer mains	Borough wide, pending further investigation	Thames Water	Partially: overall requirements for the whole Thames Water region identified, but no details available at the Camden level.

[4] Whilst Thames Water's five and 25 years plans show demonstrate that a capital investment plan is in place to address the renovation or expansion of the sewers system in the whole of the Thames Water region, it is unknown the extent to which specific plans related to Camden have been finalised and funding committed. This applies to both pumping stations and sewer mains

Type	Identified Schemes / Requirements	Where & when (if applicable)	Who – Agency Responsible	Is item already identified in strategy and/or fully funded?
	Maintenance of highway drainage	Borough wide, pending further investigation	London Borough of Camden	Need identified, funding partly available[5]
	Replacement of impermeable surfaces with permeable systems	Borough wide, pending further investigation	London Borough of Camden	No further details available
	Implementation of SUDS	Borough wide, alongside new developments or at existing facilities	Developer applicant	No further details available
Waste	Additional waste management facilities and land	–Within the NLWA area	NLWA	Need identified, no details available[6]
	Inclusion of integrated waste management facilities within new developments	Borough wide, alongside new developments	Developer applicant	No further details available
Emergency Services	New police office	King's Cross	MET	Yes: funding available as part of the s106 arrangements for the King's Cross Central development.
	Delivery of police shop fronts	Borough wide, pending further investigation	MET	Need identified, no further details available
	Modernisation and consolidation	Borough wide, pending further investigation	MET	Need identified, no further details available

[5] It is understood that the current budget available to Camden's Engineering Services department is not adequate to repair of the drains in need of repair.

[6] The NLWA boroughs, including Camden, have not to date identified suitable additional sites for managing North London's waste, as this exercise will need to be informed by the results of the public consultation on both the *Issues and Options Report* and the *North London Waste Plan* itself. Please refer to Section 7.4 in the *Utilities and Physical Infrastructure Study* for a more detailed discussion.

Type	Identified Schemes / Requirements	Where & when (if applicable)	Who – Agency Responsible	Is item already identified in strategy and/or fully funded?
	of estate and relocation of facilities if required			

Source: URS / ISU analysis and additional sources as documented in each relevant section.

1. INTRODUCTION

1.1. Purpose and Scope

This technical report is part of the Camden Infrastructure and CIL Study. The purpose of this report is to identify the utilities and physical infrastructure needs of the London Borough of Camden (hereafter referred to as Camden) over the period 2006 to 2026.

Camden's Core Strategy Preferred Approach states that the provision of utilities and physical infrastructure is vital to making development work and supporting local communities, particularly in light of the projected levels of both residential and commercial growth up to 2026[7].

In particular, the report examines the following types of infrastructure:

- General utilities (water, energy and telecommunication)
- Foul and surface water drainage (sewerage and flood risk)
- Waste management facilities
- Emergency services (police, ambulances and fire).

This report supports the achievement of the Council's vision to make Camden a borough of opportunity that adapts to a growing population, and is a safe place where people lead active, healthy lives[8].

1.2. Planning for Utilities and Physical Infrastructure

The Core Strategy Preferred Approach sets out a range of objectives underpinning the achievement of the Council's vision. Relevant to the infrastructure areas covered in this report are the objectives to:

- *"Make sure that development in Camden (…) is designed to adapt to, and reduce the effect of, climate change*
- *Ensure that development is supported by necessary infrastructure*
- *Reduce, and better plan for and manage, Camden's waste*
- *Reduce the environmental impact of transport and make Camden a better place to walk and cycle*

[7] London Borough of Camden (2008), *Shaping Camden, Camden's Local Development Strategy, Core Strategy Preferred Approach*, as published for consultation in November 2008, p. 26.

[8] Ibid. p.10

- *Support and encourage the provision of facilities and services that meet the needs of Camden's communities*
- *Reduce congestion and pollution in the borough by encouraging more walking and cycling and less motor traffic and support and promote new and improved transport links*
- *Promote the safety and security of those who live in, work in and visit Camden, while maintaining the borough's vibrancy."*

These objectives and the related sections within the Core Strategy Preferred Approach constitute the policy framework within the infrastructure areas addressed in this report are considered.

Camden's Core Strategy Preferred Approach recognised that utilities, waste management facilities, flood risk measures and emergency services are essential for development to go forward and for communities to adapt to a growing population. However, strategic planning for their delivery can prove challenging, as explained in greater detail below.

The primary, if obvious, reason for this is that Camden is not directly in charge with planning for the provision of utilities and physical infrastructure. Utility providers are private companies that operate in a private market, albeit heavily regulated to ensure that the incentives to underprovision are minimised, where they contract arrangements directly with their end users[9]. Similarly, flood defence in Camden involves a number of bodies including Thames Water, in its capacity as sewer operator, and the Environment Agency, as the agency responsible for overseeing regulatory responses to minimise flood risk. Waste management is predominantly planned by the North London Waste Authority, which is a planning body including the London Borough of Camden in co-operation with the other North London authorities[10]. Finally, emergency services are provided by Greater London wide agencies, namely the Metropolitan Police, the London Ambulance Services NHS Trust and the London Fire Brigades.

Secondly, the physical facilities and infrastructure under investigation are not provided in unitised form, but are delivered in variable sizes and capacities. Whilst we are able to

[9] Furthermore, competition has meant that third parties can install a network and then seek adoption by the host operator (broadly following conventional techniques, albeit not using host operator direct labour teams). Under particular circumstances, a third party may also request the host network operator to provide a boundary point of connection and install an 'inset' or 'island' network that is totally independent, in terms of interconnectivity, of the surrounding historical network. The protocols associated with operational targets remain, given that the third party vehicles are basically bound by the same rules as the host operators.

[10] This is the case even if Camden Council is responsible for the collection and management of waste.

The other North London Waste Authority partners are the London Boroughs of Barnet, Enfield, Hackney, Haringey, Islington and Waltham Forest. North London Waste Authority (2008), North London Joint Waste Development Plan.

model the additional demand for electricity, gas, water and sewerage for the growth areas up to 2026, URS is not in a position to translate this additional demand into requirements for physical infrastructure without assistance from the relevant agencies, which is not always readily forthcoming.

Thirdly, all the infrastructure areas covered within this report are managed and/or planned for at a geographical level that is wider than Camden's administrative boundaries. Waste disposal is planned at the North London level and emergency services at the Greater London level. Utilities providers cover even wider geographical areas, with the Thames Water region in which Camden is located extending over most of the Thames Valley. This means that baseline information and forecasts are unlikely to be available at the Camden level, with ad hoc (and expensive) modelling exercises required if the implications of growth within the borough are to be accurately assessed in terms of additional physical requirements[11]. For this reason, it should be noted that it has not been possible to definitively conclude an assessment of specific infrastructure requirements for some utilities.

Fourthly, whilst providers plan at a wider geographical level, the time horizon tends to be short (or sometimes medium) term only. For instance, utility companies work on the basis of five year plans[12]. Utilities providers in particular tend to adopt a reactive rather than proactive approach that tends to reflect a given solution for a particular development. Also, each of the providers works under different growth assumptions, which do not necessarily relate to local authorities' residential and commercial growth targets and aspirations. As a result even if the planning horizon were in line with the LDF 2006-2026 period, the demand for additional services that they would estimate as part of their own planning process would be likely to differ substantially from what would emerge from the Council's growth trajectory.

Finally, the demand for some of the infrastructure covered in this report is not proportionally linked to population or employment growth. In the case of emergency services for instance, the demand of additional staff and the associated physical facilities are driven by historical rates of provision or political decisions taken from time to time to prioritise provision of additional resources[13], and flood risk measure are partly driven by climate change and national policy. With regards to utilities, it is possible to estimate the additional demand arising from the projected residential and commercial growth. However, estimating the extent and cost of the associated physical infrastructure needs is practically impossible at a strategic level, as the specifics of the location of need and of the individual sites are the key determinants of the scale and cost of works.

[11] For instance, Thames Water is likely to charge the Council in the region of £50,000 to undertake a detailed assessment of the impact of projected growth for the entire borough.

[12] Thames Water also has a 25 years plan which does not however provide investment details beyond 2015.

[13] For instance the Metropolitan Police Authority estimate future needs based on the number of emergency calls and crime at the local authority level, although it considers both the projected population and any large scale development coming forward.

For all the aforementioned reasons the approach of this utilities and physical infrastructure needs assessment differs from the one adopted to identify the impact of growth on social infrastructure and transport.

1.3. Approach and Structure

Research Methods

This report has been prepared as a technical study and is a desktop review that has drawn on published written sources of information; information provided by various; and phone interviews and meetings with various utilities and services or infrastructure providers and agencies; and additional written information provided by those agencies. A detailed list of sources is provided in footnotes in the relevant chapters.

Camden Infrastructure Model

URS has produced a bespoke *Camden Infrastructure Model* that can be used to help assess and model the demand for infrastructure arising from development. However, the Model is of most use for assessing demand where there is a clear and direct relationship between residential and/or commercial development and infrastructure that is measurable at the local level. This is not the case for infrastructure such as flood defence or waste, but can be used (to a degree) to assist in modelling demand for utilities. Hence the model has only been applied as follows:

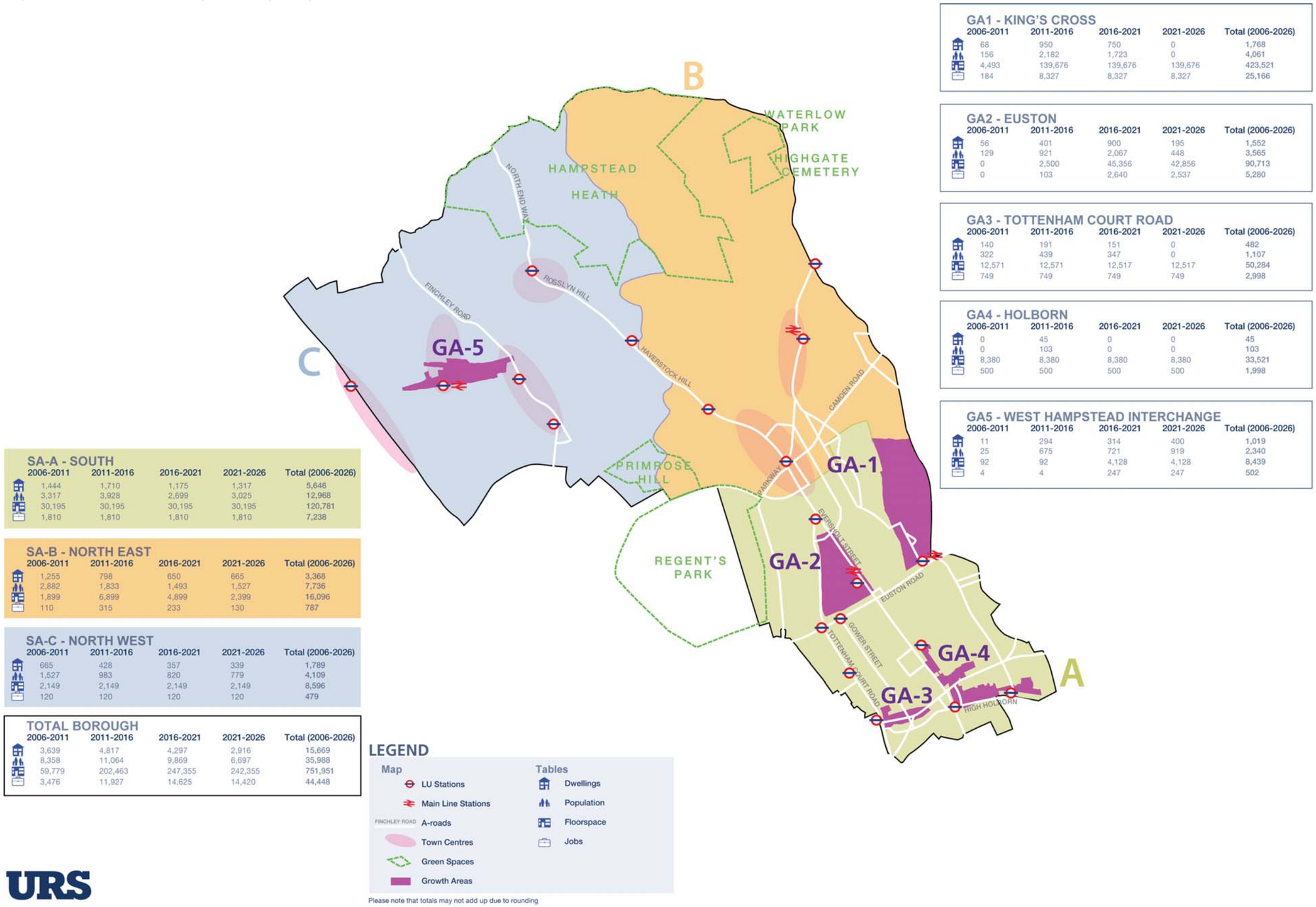
- URS has modelled expected future flows for water and sewerage and loads for energy (including gas and electricity), and discussed the implications from a sustainable energy perspective. However URS has not modelled the physical requirements associated with such expected flows and load[14].
- For the physical infrastructure associated with flood risk, waste management and emergency services URS did not model future demand.

With regard to looking at the spatial distribution of growth and for the purposes of this study, the borough is broken down into eight areas: comprised of the five growth areas and three sub-areas for which residential and commercial development growth has been forecast (see **Figure 1-1**).

.

[14] Planning undertaken by utilities companies is generally reactive rather than proactive. It also depends on complicated flow modelling to which each respective utilities company solely holds the rights. EDF, National Grid and Thames Water would need to undertake the assessment themselves to ensure that the impact of growth on their entire network is fully considered.

Figure 1-1: Camden's Development Trajectory, 2006 to 2026



GA1 - KING'S CROSS

	2006-2011	2011-2016	2016-2021	2021-2026	Total (2006-2026)
Dwellings	68	950	750	0	1,768
Population	156	2,182	1,723	0	4,061
Floorspace	4,493	139,676	139,676	139,676	423,521
Jobs	184	8,327	8,327	8,327	25,166

GA2 - EUSTON

	2006-2011	2011-2016	2016-2021	2021-2026	Total (2006-2026)
Dwellings	56	401	900	195	1,552
Population	129	921	2,067	448	3,565
Floorspace	0	2,500	45,356	42,856	90,713
Jobs	0	103	2,640	2,537	5,280

GA3 - TOTTENHAM COURT ROAD

	2006-2011	2011-2016	2016-2021	2021-2026	Total (2006-2026)
Dwellings	140	191	151	0	482
Population	322	439	347	0	1,107
Floorspace	12,571	12,571	12,517	12,517	50,284
Jobs	749	749	749	749	2,998

GA4 - HOLBORN

	2006-2011	2011-2016	2016-2021	2021-2026	Total (2006-2026)
Dwellings	0	45	0	0	45
Population	0	103	0	0	103
Floorspace	8,380	8,380	8,380	8,380	33,521
Jobs	500	500	500	500	1,998

GA5 - WEST HAMPSTEAD INTERCHANGE

	2006-2011	2011-2016	2016-2021	2021-2026	Total (2006-2026)
Dwellings	11	294	314	400	1,019
Population	25	675	721	919	2,340
Floorspace	92	92	4,128	4,128	8,439
Jobs	4	4	247	247	502

SA-A - SOUTH

	2006-2011	2011-2016	2016-2021	2021-2026	Total (2006-2026)
Dwellings	1,444	1,710	1,175	1,317	5,646
Population	3,317	3,928	2,699	3,025	12,968
Floorspace	30,195	30,195	30,195	30,195	120,781
Jobs	1,810	1,810	1,810	1,810	7,238

SA-B - NORTH EAST

	2006-2011	2011-2016	2016-2021	2021-2026	Total (2006-2026)
Dwellings	1,255	798	650	665	3,368
Population	2,882	1,833	1,493	1,527	7,736
Floorspace	1,899	6,899	4,899	2,399	16,096
Jobs	110	315	233	130	787

SA-C - NORTH WEST

	2006-2011	2011-2016	2016-2021	2021-2026	Total (2006-2026)
Dwellings	665	428	357	339	1,789
Population	1,527	983	820	779	4,109
Floorspace	2,149	2,149	2,149	2,149	8,596
Jobs	120	120	120	120	479

TOTAL BOROUGH

	2006-2011	2011-2016	2016-2021	2021-2026	Total (2006-2026)
Dwellings	3,639	4,817	4,297	2,916	15,669
Population	8,358	11,064	9,869	6,697	35,988
Floorspace	59,779	202,463	247,355	242,355	751,951
Jobs	3,476	11,927	14,625	14,420	44,448

LEGEND

Map
- LU Stations
- Main Line Stations
- FINCHLEY ROAD A-roads
- Town Centres
- Green Spaces
- Growth Areas

Tables
- Dwellings
- Population
- Floorspace
- Jobs

Please note that totals may not add up due to rounding

URS

Source Based on Joint analysis by London Borough of Camden and URS Corporation

Report Structure

The report has a two-level structure:

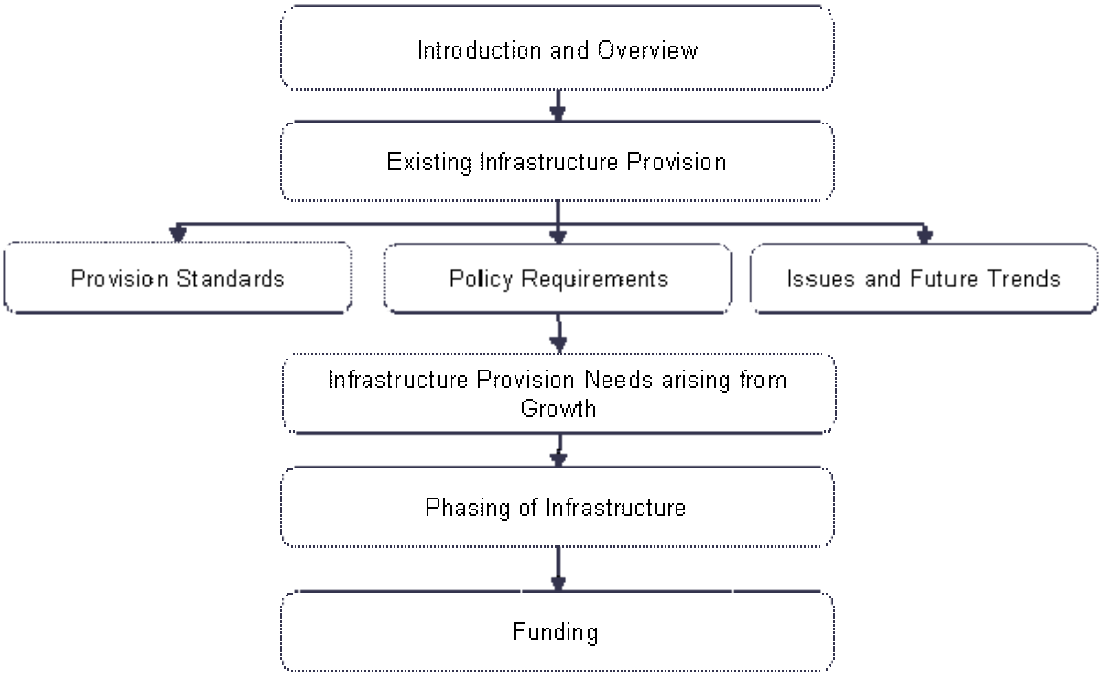
- First, the report is broken into a series of sections that deal with each type of infrastructure in turn.
- Secondly, each section is then laid out in accordance with the approach that has been taken to investigate the implications of growth for that type of infrastructure.

In terms of the upper level, the report is structured as follows:

- **Part A** covers general utilities infrastructure including:
    - Water
    - Energy (electricity and gas including analysis of sustainable energy generation) and
    - Telecommunications.
- **Part B** covers foul and surface water drainage including:
    - Sewerage
    - Flood risk
- **Part C** covers waste management.
- **Part D** covers emergency services including:
    - Police
    - Ambulance and
    - Fire services.

For each type of infrastructure listed above the corresponding section is set out to reflect the approach that has been taken to examining the demand and resulting need (where it has been possible to reach a definitive conclusion) for infrastructure. **Figure 1-2** below illustrates this process and is followed by an explanation of the approach.

Figure 1-2 Internal section structure illustrating the approach followed for each infrastructure investigation



In terms of the structure within each section corresponding to a different type of infrastructure a common, albeit flexible, approach has been adopted to ensure consistency whilst also accounting for the differences in the level of information available and in the operational arrangements between infrastructure types. The assessment is structured in accordance with a step-by-step process as described below:

- Introduction and overview: This section sets out the relevant policy driver for each type of infrastructure and the context in which providers operate. It also defines the scope of the analysis.

- Existing and committed infrastructure provision: This section provides an account of the baseline position with respect to the existing level of provision of the infrastructure in question, and any imminent (and therefore certain) planned investments that will add to existing provision. Where possible, detail is given as to how the forthcoming infrastructure provision has been funded and its cost. It finally concludes on the adequacy of existing and committed infrastructure.

- Estimating future demand (provision standards or policy requirements and related issues or trends):

    - For the infrastructure areas covered in **Part A** of this report (general utilities) and for sewerage (**Part B**) the industry follows certain provision standards, and these standards are the ideal means for estimating future demand for utilities.

- For the infrastructure areas covered in **Parts C**, **D** (waste and emergency services) and for flood risk (**Part B**) policy requirements at the national, regional and local levels are referenced wherever available.
- Trends or issues that could impact upon future provision are also explored as part of this section.

- Demand arising from growth:
  - For the infrastructure covered in **Part A** (general utilities) and for sewerage (**Part B**) of this report this section sets out, with reference to the Infrastructure model, the extent and location of future additional demand for services.
  - For the infrastructure areas covered in **Parts C**, **D** (waste and emergency services) and for flood risk (**Part B**) the section instead sets out and discusses the infrastructure needs, any additional action that would help the Council accurately estimate the impact of projected growth on the relevant infrastructure area and ensure that additional demand is not unmet.
- Resulting infrastructure requirement:
  - For the infrastructure covered in **Part A** (general utilities) and for sewerage (**Part B**) of this report this section discusses the likely implications for the provision of new facilities to provide a broad understanding of the scale of the requirements associated with the projected levels of growth. It also identifies, with reference to the Infrastructure model, when the additional demand is likely to come forward. It discusses how/ whether the infrastructure can be provided over a funding cycle. The phasing will consider infrastructure requirements over five year periods (2006-2010, 2011-2016, 2017-2020, and 2021-2026).
  - For the infrastructure areas covered in **Parts C**, **D** (waste and emergency services) and for flood risk (**Part B**) this section highlights whether the projected phasing of residential and commercial growth is expected to trigger the need for additional provision.
- Funding of infrastructure: The section sets out the funding options to support the delivery of any infrastructure facilities or studies and investigations identified in the infrastructure needs assessment section. If appropriate, the section differentiates between financial resources available to fund both local and strategic infrastructure.
- Summary and Recommendations: This section sets out a summary of the infrastructure needs assessment findings, together with any recommended actions or a list of infrastructure requirements wherever appropriate.

PART A – GENERAL UTILITIES

2. WATER

2.1. Introduction and Overview

Scope

Drinking, or potable, water for Camden is afforded via a system of pipes, owned and operated by Thames Water[15], that are laid under the streets of Camden. The water is frequently monitored to ensure that it is safe to drink.

This section aims to review infrastructure that currently exists and establish what the water network is capable of doing when compared to what it actually does. Taking into account the natural, or 'organic', growth in usage (infill development for example) as well as the projected impact of the aspirations of the borough, risks and opportunities to delivering the proposed growth should subsequently be established.

Management Arrangements and Responsibilities

As previously identified, the incumbent water network operator for Camden, and the majority of London plus the Thames Valley, is Thames Water[16]. Thames Water is the historic Water Board privatised in 1988 as part of a Government programme and is responsible for the safe operation of the water network.

Camden is part of the London Water Resource Zone (WRZ), which is defined as an area within which all water resources can be shared and therefore customers experience the same level of service. Water resources are planned at a WRZ level. The largest WRZ in Thames Water's area is London, which covers the Greater London area[17]. Within each Water Resource Zone (WRZ), there are several water supply zones (WSZ) which constitute a second tier operational level of the water network.

Thames Water are tasked, via obligations placed upon them by the regulator OFWAT and the Water Act of 1989, to afford potable water to the borough. They are subsequently measured in terms of performance by various means, including security of supply and quality of drinking water.

[15] Consultation with Thames Water has been inconclusive on the specific capacity and requirements for the Camden area.

[16] The Thames Water region includes most of the Thames catchment area, from Warwickshire to Sussex and from Gloucestershire to Essex.

[17] The other five WRZs, SWOX (Swindon, North and South Oxfordshire), Kennet Valley, Henley, SWA (Slough, Wycombe and Aylesbury), and Guildford are collectively called the Thames Valley WRZs. http://www.thameswater.co.uk/cps/rde/xchg/SID-28D3C3F3-E4660627/corp/hs.xsl/5389.htm.

Thames Water review their network against known development and project capital expenditure programmes to match their obligations, noting that there is also an inherent weakness that encourages reactive management in many instances. In essence, whilst Thames Water do consider, to an extent, the forward planning of asset replacement and capacity provision, the system, particularly at a local level, only reacts to developments that are actively in planning and therefore any extension of the network is geared to that sole requirement limiting opportunity to plan for the wider area. This reactive approach also encourages financing to be developer lead although future revenues are acknowledged when pricing of new mains is undertaken.

The use of boreholes that draw water from aquifers can also be a source for end users; in Camden, borehole water is used for irrigating Waterlow Park, and will be used for heating the pool at Kentish Town Sports Centre[18]. At this juncture, it has not been possible to identify what the water is used for (could be used for production and / or consumption); regardless, the process will be closely managed in conjunction with the Environment Agency via a licence that determines the volume that can be drawn.

Camden's Water System

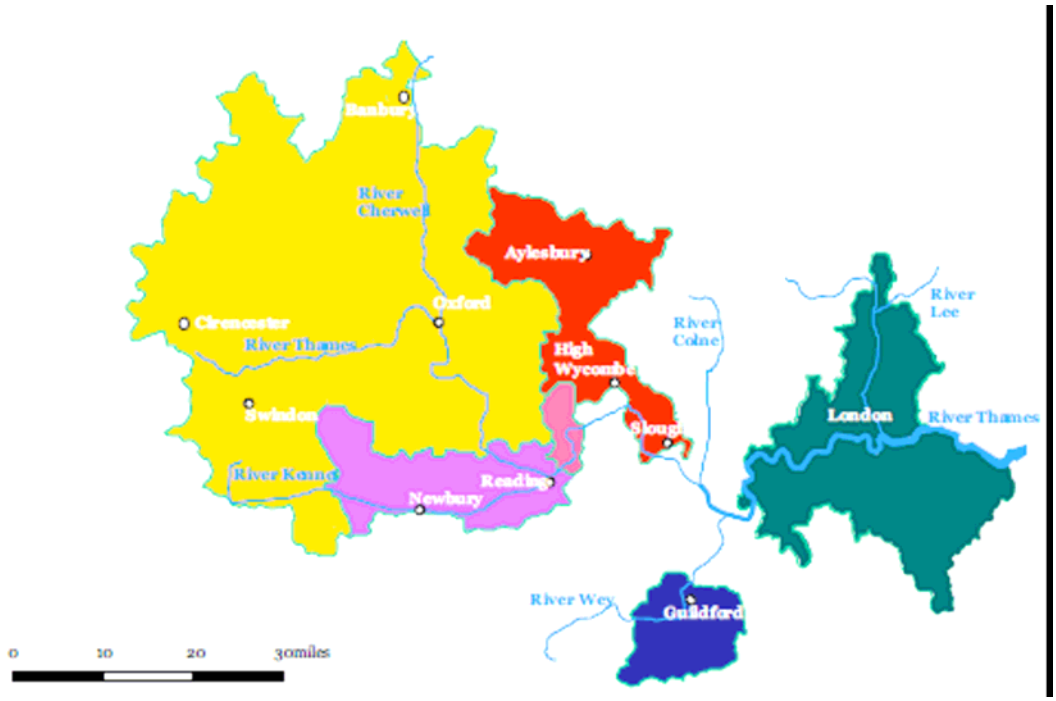
Camden's water network is part of the wider London network that began predominantly in the Victorian era and subsequently extended as additional requirements have been identified. The network is based upon large cross sectional diameter mains that decrease in size until service pipes afford final connection into individual properties.

The pipes are a mixture of material, nowadays using polyethylene (PE) but historically a mixture of ductile iron and / or lead was prevalent.

Thames Water manages the network in and around Camden, which is part of an area defined as the 'London Water Resource Zone'. **Figure 2-1** shows the London Water Resource Zone and the other zones managed by Thames Water; please note that Thames Water manage sewerage as well as potable water and this does not necessarily reflect the same boundaries as the area for sewage is larger than that of clean water.

[18] London Borough of Camden, Culture and Environment Directorate, 18/05/2009 and 04/09/2009.

Figure 2-1: Thames Water's Water Resource Zones



Source: Thames Water (2008), Draft Water Resources Management Plan, Volume 1: Summary Overview, p. 4.

Clean water resources for Camden, and London in general, are largely based on abstraction from the River Thames and River Lee, and subsequently stored in reservoirs at Crossness, near Bexley, and Walthamstow.

Drinking Water Provision

'Raw' water is taken from a variety of both natural and manmade resources including rivers and lakes and reservoirs and transported via pipes to the treatment works.

The pipes take the water to an underground service reservoir or a water tower. The reservoirs are covered with grass or gravel so that the water will stay clean. When the pipes lead to a water tower, the water is pumped to the top, then gravity will transport the water to houses and factories.

From here water travels through smaller mains, flowing into the network of pipes in our towns and cities. All the water that then flows into our homes is of drinking water quality. In some areas it can take up to a week for the water to get from the treatment works to our homes and more chlorine will be added to ensure that it is still clean when it comes through to our taps.

Source: waterguide.org.uk

The service pipes that provide water to individual properties are installed of a size that reflects the requirement of the building; this too is true of mains in the road. A main located in a main thoroughfare therefore is likely to have a greater cross sectional area than, say, a main that services a secondary road. Likewise, a pipe that serves a

swimming pool is likely to be greater in cross sectional area than that of an individual dwelling.

Typically, and as an example only, two storey dwellings will use a 25mm^2 or 32mm^2 service pipe for each unit; for an apartment building, the intake is likely to be, say, 63mm^2.

To ease both the impact on the water network and to provide suitable pressure, particularly in high rise buildings, it is normal to store water in tanks and use pumps. For developments of semi detached or detached properties, not exceeding three floors say, this is not required.

The management of the impact on the water system by storage means that buildings store enough water to manage normal consumption and the tanks are then replenished with a steady 'trickle' rather than a substantial draw down that would cause problems on the wider network. With enough storage, and as an example only, a large building could run off the same size service pipe as that of a single residential unit: in reality, this would not be the case but the point is hopefully demonstrated.

The sizing of all mains and services is critical as Thames Water provide a minimum pressure of 1Bar for the purposes of getting appliances, such as washing machines, to work and also to keep the water flowing; this latter point is crucial as water needs to be kept moving in the distribution system.

If the assumption is made that water is effectively a 'food' item, there is a need to consider this in the context of health; water therefore that doesn't flow can stagnate and this inaction may generate bugs that subsequently cause illness in humans.

Policy Drivers

In the context of the study undertaken, the assessment of the water network is necessary, when considered against the impact of ever increasing demand incurred by development, as there is a finite level of capability contained within the existing system.

The Camden Core Strategy document requires all developments and developers to consider the following guidelines:

- Protecting existing drinking water and foul water infrastructure
- Making sure development incorporates efficient water and foul water infrastructure
- Ensuring development does not cause harm to the water environment and / or water quality[19].

[19] London Borough of Camden (2008), *Shaping Camden, Camden's Local Development Strategy, Core Strategy Preferred Approach*, as published for consultation in November 2008, p. 47.

To reflect national policies, Thames Water submits a water management plan to OFWAT, the regulator, and the Environment Agency to ensure that economic and environmental aspects are fully considered. Once the process has been reviewed and commented upon, the Secretary of State for Environment, Food and Rural Affairs (DEFRA) ultimately approves the final document.

This document serves to determine the capital expenditure that Thames Water is committed to (for example, to replace existing assets or promote new water resources) as well as agreeing a formula to recover costs from end users.

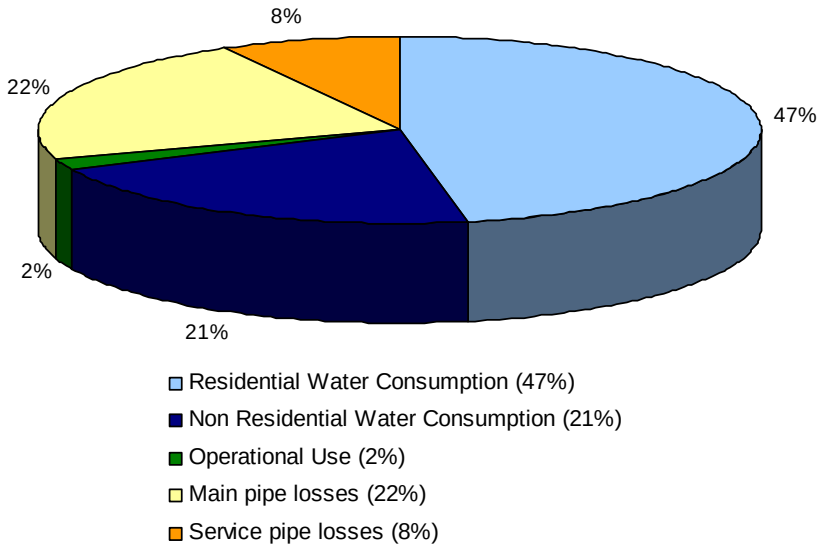
2.2. Existing and Committed Infrastructure

Existing Provision

As discussed in **Section 2.1**, clean water resources for Camden and London are predominantly drawn from the River Thames and River Lee, and subsequently stored in reservoirs at Crossness, near Bexley, and Walthamstow.

Figure 2-2 illustrates the water consumption breakdown for the whole Thames Water region for the year 2006/07.

Figure 2-2: Water Consumption in the Thames Water Region, 2007/2006



Source: Thames Water: http://www.thameswater.co.uk/cps/rde/xchg/corp/hs.xsl/5392.htm - dWRMP Appendices Volume 3.

In the whole of the Thames Water supply area it is estimated that 2006/07 household consumption accounted for 47% of demand, non-household consumption 21%, and unbilled and operational use 2%.

Given the ageing network and historical limited funding for asset replacement, leakage from the network accounted to some 30% of total demand, split into 22% distribution losses (mains in road) and 8% customer service pipe (individual service pipes to properties) losses. Leakage equates to 713M litres of water per day[20]. Recent commentary from Thames Water identifies that the network, which was developed largely from the Victorian era, has leaks that may never prove to be economical to repair.

The London Water Resource Zone is predominantly made up of service sector industries and Thames Water report that there has been a marked decline in non-service sector demand (mainly in the food, drink and tobacco sector), albeit this reduction has been more than off-set by a rise in the former, with an anticipated ongoing stronger growth in demand against this.

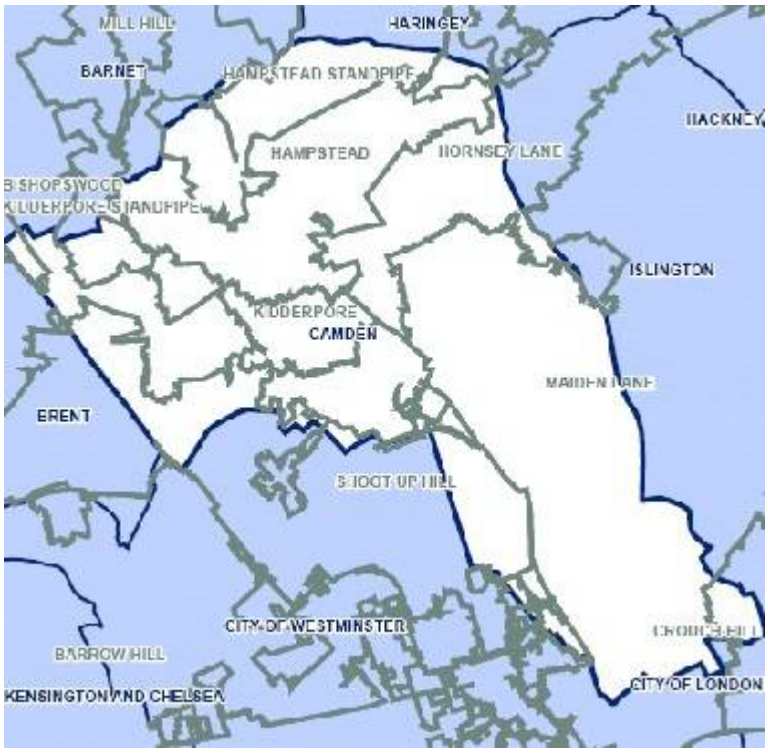
Within the London Water Resource Zone (WRZ), there are a number of water supply zones that furnish supplies to Camden[21] and these are illustrated in **Figure 2-3**. These zones are the second-tier operational areas affording water supplies to Thames Water customers. These networks potentially contain a mixture of underground storage facilities, pumping stations, large cross section mains as well as smaller bore mains and services. Consultation with Thames Water has been inconclusive on existing water system capability, plans for the borough at both local and strategic levels, as well as what would be required to deliver growth in Camden[22].

[20] Thames Water: http://www.thameswater.co.uk/cps/rde/xchg/corp/hs.xsl/848.htm accessed on 18/04/2009.

[21] Thames Water: http://www.thameswater.co.uk/cps/rde/xchg/corp/hs.xsl/5330_5475.htm accessed on 18/04/2009.

[22] Thames Water have been requested to provide Camden specific details beyond that furnished from published material but this has not been forthcoming at the time of writing, and despite contact with the CEO office at Thames Water and a meeting in June 2009.

Figure 2-3: Water Supply Zones in Camden



Source: Thames Water, Our Major Projects, available at http://www.thameswater.co.uk/cps/rde/xchg/corp/hs.xsl/5330_5475.htm, accessed on 18/04/09.

Planned Investment

From published documents[23], and based upon current forecasts, Thames Water predict as a whole that the London WRZ will have a deficit in provision of potable water that will increase from 2% in 2009/10 to 20% by 2034/35. The deficit is essentially being driven by demand, noting that leakage management may offset an element of the shortfall.

Thames Water identify that despite the 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 the ever increasing demand from both commercial and residential requirements.

Thames Water believe that a 'twin track approach' in balancing the supply and demand that involves the use of enhanced demand management activities combined with the development of new resource schemes, such as reservoirs, will be required to deliver ongoing capacity capability.

[23] Thames Water: http://www.thameswater.co.uk/cps/rde/xchg/corp/hs.xsl/5390.htm and http://www.thameswater.co.uk/cps/rde/xchg/corp/hs.xsl/2804.htm accessed on 18/04/09

Demand Management

Thames Water published Water Resource Management Plan in May 2008, outlining its strategy to support and promote demand management. To close the supply - demand deficit. These primarily include:

- Leakage reduction techniques (the replacement of Victorian mains) over the period 2010 to 2015
- Active leakage control
- A progressive programme to employ compulsory metering to all new developments as well as retro fitting to existing housing stock (the plan being to increase the proportion of domestic properties with meters from 25% to approximately 54% over the next 5 years)
- Establish an enhanced water efficiency programme.

New Schemes: the Beckton Desalinaton Plant and the Upper Thames Reservoir

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 with completion planned for early 2010. This will afford enough water for a further 400,000 households or 900,000 people, pumping water into the reservoirs that feed into Camden. The total cost of the project, including the pipeline, is £250m, and is funded by Thames Water, with costs recovered via customer bills between 2005 and 2010[24].

Further afield, there are also plans for the delivery of the Upper Thames Reservoir, a large reservoir in Oxfordshire which is the preferred option to maintain a security of supply in London from 2021 onwards. The scheme is paid for by Thames Water but financially recovered, in essence, by customers of Thames Water[25].

Adequacy of Existing and Committed Infrastructure

The above new schemes are part of a package of measures being pursued by Thames Water to allow for growth in Thames Water's operation area including greater London and thereby also including Camden[26].

[24] Thames Water website, http://www.thameswater.co.uk/cps/rde/xchg/corp/hs.xsl/2802.htm, accessed on 16/04/2009.

[25] Thames Water website, http://www.thameswater.co.uk/cps/rde/xchg/corp/hs.xsl/2550.htm, accessed on 16/04/2009.

[26] Attempts to verify this assumption with Thames Water have not been successful at the time of writing despite repeated inquiries.

While additional supply will be added by these schemes capacity there is still a need to convey the supply to the point of demand. As with all central London boroughs, space in existing highway is extremely limited. Therefore works to replace mains are usually expensive and constrained, particularly when considering that other statutory bodies, such as gas, electricity and telecommunication providers, are also under extreme pressure to maintain their own regulatory obligations.

In addition to physical constraints, indirect pressures and requirements are also inherent in the delivery process. Typically, they include pressure from local stakeholders whom are continually affected by excavations in highways, working hour's restrictions and limited resources. The utility industry as a whole is already under-resourced and therefore major events such as the Olympics tend to exacerbate mains replacement programmes even further.

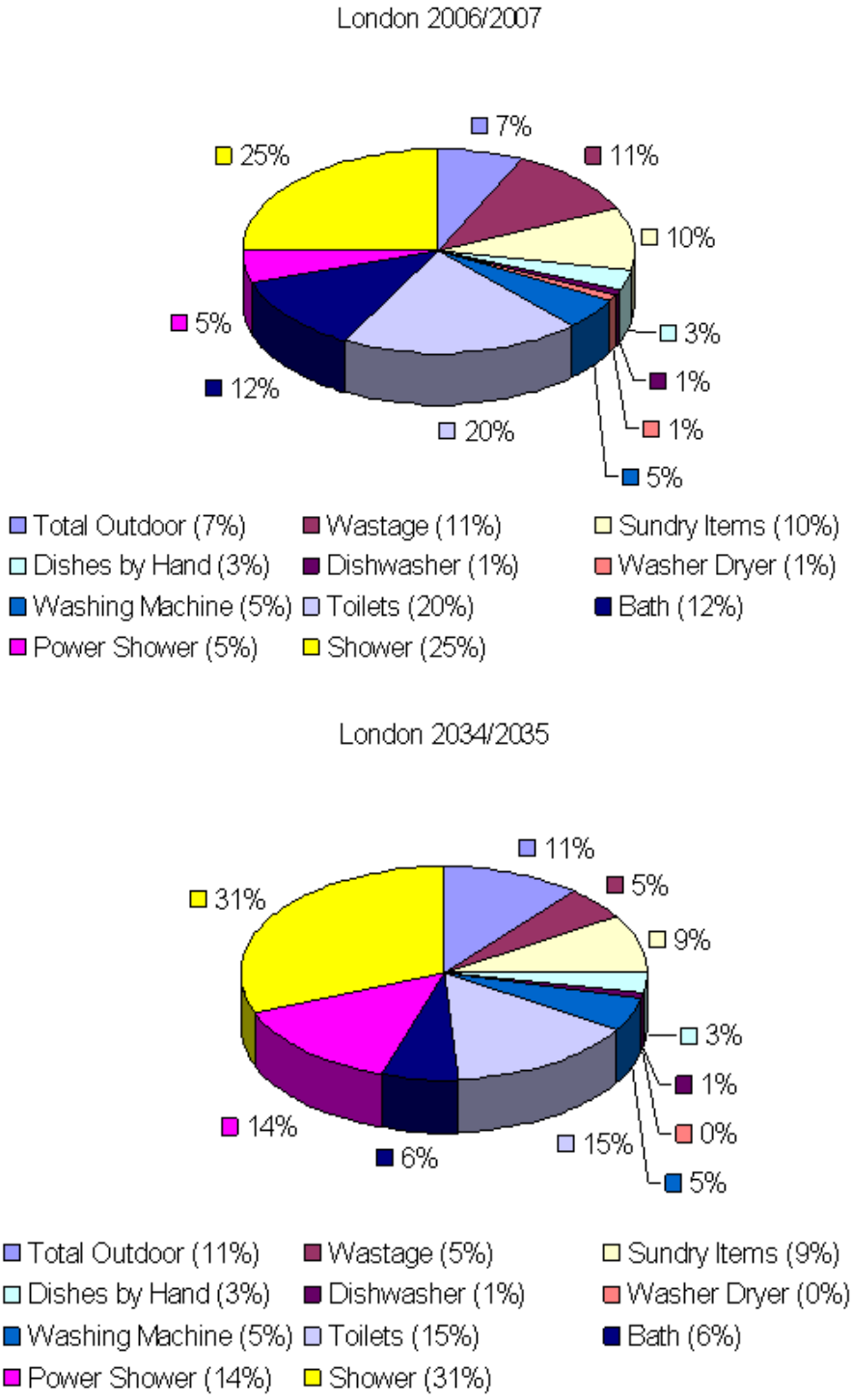
2.3. Estimating Future Demand

Provision Standard

To secure a basic understanding of the system capabilities, each type of additional development will need to have recognised water consumption demand placed against it.

The ability to apply a straightforward approach for residential and non residential remains a challenge although the former is covered via a historical application of 160l/day of clean water so computations should readily reflect against known dwelling numbers

Figure 2-4: Residential Water Consumption, 2006/09 and 2034/35



Source: Thames Water, http://www.thameswater.co.uk/cps/rde/xchg/corp/hs.xsl/5392.htm - Water Resources Management Plan Appendices Volume 3 accessed 18/04/2009.

Figure 2-4 represent the shift in likely usage in residential applications over the course of the next 25 years for properties that have unmeasured water supplies The above charts identify properties that are unmeasured (i.e. without a water meter) with a noticeable increase in consumption based on population habits and the potential impact of climate change.

Using Thames Water data and predicted out turn figures, the use of meters on properties records a benefit of some 8 litres of water per head per day at today's consumption rates when compared against unmeasured properties; however, for the projected Thames Water forecasts for 2035, this benefit is completely negated via ongoing changes in population habits. Based upon the projections, there will be a deficit of circa 1.2 litres per head per day.

The non residential element is more difficult and computation exercises have determined an approach that works on a square metreage approach and offers a degree of knowledge but this will be subjected to ongoing review.

The resulting loads will facilitate projections of water demand against historical data so that shortfalls and / or excess can be considered. At this stage, figures projected will need to be discussed with Thames Water to establish their viability[27].

Regardless of the figures utilised, outturn figures however will only proffer likely engineering requirements as, until a formal design is completed against set network criteria, the water system, given its 'dynamic' nature, is always subject to change and re-configuration. In saying that, 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.

Conventional computations, normally derived by mechanical and electrical (M&E) consultants utilise figures for specific and known quantums; i.e. a building with a particular specification will require a given level of water consumption.

The utility industry applies diversity factors[28] to those figures and these change somewhat dependant upon the strategic level – for example, a main in High Street will have a lower diversity factor applied than that of say computations for a new main that is required for the borough.

[27] As in similar situations outlined above regarding existing provision, ISU is still attempting to confirm this with Thames Water.

[28] Diversity factors are those applied to networks that assume that not all appliances are to be utilised at the same time. As an example, a building may have a total requirement, if all appliances within it were used, of 200 litres of water. Given that not all items will be used, the actual likely local impact on the water network may be, say, 100 litres. On the network in Camden, as a borough, this may translate into, say, 50 litres and for the London WRZ, say 10 litres. These are purely fictional figures but the purpose is to demonstrate that when more and more buildings are considered, the impact changes at different levels of the network.

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. It is worth noting that historical figures used by Thames Water were based upon 140l/day/person but these have risen in recent years as expectations in provision rise[29].

Commercial floorspace, such as offices, also have a factor applied; normal protocols are to use actual design criteria (number of taps, for example) but for the purposes of assessing the potential impact, a figure of 7.08 l per day per sqm and of 6.49 l per day per sqm have been developed as a guide for office and retail/leisure respectively.

Table 2-1: Water Provision Standards

Development		***Provision Standard***
Residential		160 l/day per person
Commercial	Offices	7.08 l/day per Sqm
	Retail and Leisure	6.49 l/day per Sqm

Source: Residential standards are those published by Thames Water; commercial standards have been computed from known projects but these will vary as they are ultimately dependant upon actual fittings.

Leisure facilities are probably the one exception to the rule although, in the case of swimming pools, these tend to be filled at a relatively slow rate and the replenishment rate can be restricted via the use of smaller diameter service pipes.

Issues/ Future Trends

Water use per person is affected by several factors, which typically include:

- Household occupancy
- Water use via appliances
- Fixture and fittings within the property
- Householders' water use behaviour, including garden use and
- Whether the property is metered or not.

[29] Thames Water currently assess that water usage per person will increase given the status quo; however, the impact of the Code for Sustainable Homes and other legislation may decrease this to a lower level. Notwithstanding this, there is also the added impact, potentially short term, of the economic downturn. Current predictions are 135l/person/day but this is not a proven figure. Thames Water assess that current planning, based upon the 160l/person/day, remains a sensible approach. Derived from the draft Water Resources Management Plan issued by Thames Water and accessed on 18/04/2009.

The figure of 160l/day/person used to estimate future residential water consumption is a current baseline utilised by Thames Water; noting that there is an aspiration, via the establishment of the Code for Sustainable Homes, to reduce this value, there is a potential adjustment in this figure. Opportunities on new developments include rainwater harvesting (i.e. to use 'raw' water for toilets as an example), more efficient appliances and general education are all being promoted but given the timing of the report, actual trends are not known at this juncture.

However, Thames Water forecast that demand for water will rise predominantly due to:

- An increasing population
- An increase rise in single occupancy houses still using all the appliances of a larger unit
- Smaller family groups
- Climate change.

As a result, despite of the Code for Sustainable Homes criteria to significantly reduce water in new build projects, the magnitude of the increase in residential numbers alone is expected to continue to exacerbate any shortfall.

Noting the issues over leakages experienced in the wider water network, other aspects of population habits are likely to continue to increase demand via organic means; for instance, high volume high pressure showers somewhat negate the benefit of showering.

Added to the pressures of managing our resources better, global warming, or climate change, is likely to result in hotter, drier summers and milder, wetter winters. Thames Water also expects to experience more extreme weather events (such as droughts or flooding) in the future.

As a result of climate change, there is an expectation of greater demand for water in the summer as people bathe, shower or water their gardens more frequently.

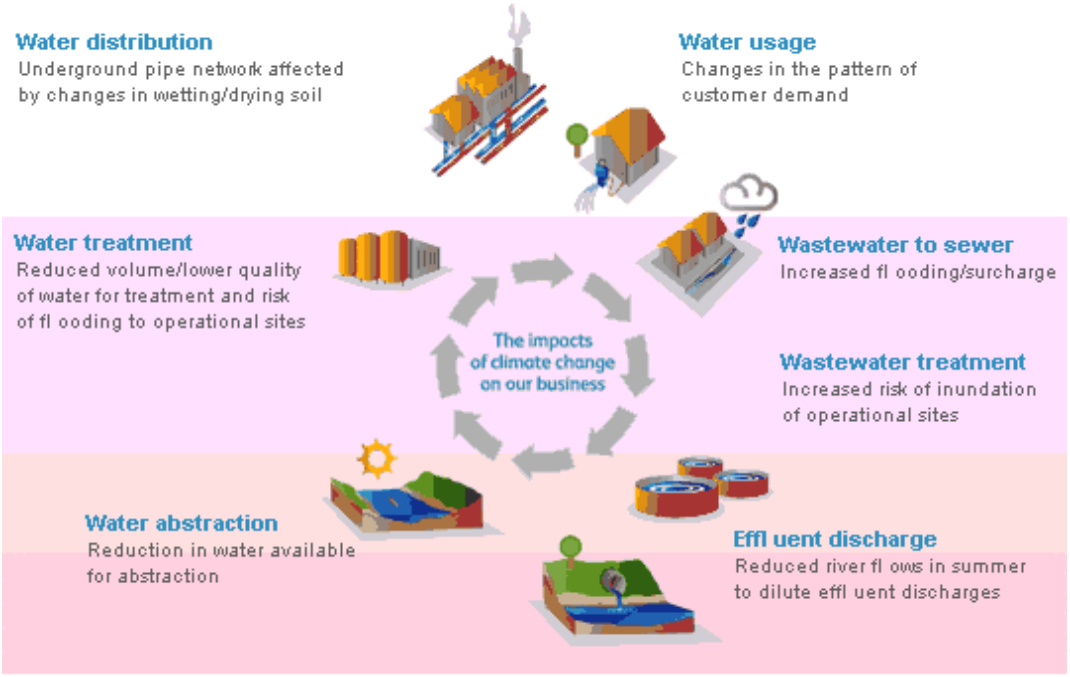
On average, about 6 per cent of household water is used in the garden, but on hot days this can already rise to over 50 per cent.

The amount of water businesses use is also likely to rise as air conditioning is increasingly used to cool offices and IT systems, for example. Whilst not necessarily an issue in Camden, the agricultural industry is also expected to be affected; climate change is predicted to result in soils being able to hold less moisture, meaning that more water for crops is likely to be needed.

This increased demand for water will come at a time when existing water resources are under increasing pressure. Climate change will reduce the period when our groundwater sources can refill and will reduce summer rainfall. As a result, managing demand for water though activities like wider water metering and water efficiency programmes to encourage people to use water wisely will be increasingly important in adapting to the

impacts of climate change. New sources of water, such as desalination, will also need to be developed.

Figure 2-5: Impact of Climate Change on Water Consumption, Thames Water



Source: Replicated from Thames Water website: http://www.thameswater.co.uk/cps/rde/xchg/corp/hs.xsl/5586.htm accessed 18/04/2009

On a more immediate and practical front, the mains located in the Camden area have been designed for a lifecycle of between 40 and 60 years and therefore replacement of existing assets is likely to continue at pace given their age. In saying that, major works in Camden have currently been concluded albeit, overall, Thames Water are targeting to have replaced some 1,300 miles of mains over a six year period that ends in 2010.

2.4. Demand for Water arising from Growth

Typically, the utility industry works on reactive processes that use specific data provided at the design stage to get an engineering proposal. Whilst this will still be partly the case in the scenario above, the advanced installation of strategic mains, if required, is beneficial.

Currently, up until 2034/35, Thames Water has assessed that within the London water resource zone (or WRZ), the population will rise by 1M people with consideration of an additional allowance for clandestine ('uncounted') and / or short term migratory population patterns. 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 2006 figures[30] reflect some 315.83Ml/day for service sector industries, including education and health, with the remaining 92.26Ml/day being non-service sector.

Thames Water has not confirmed the benchmark figures of growth that they have employed when computing capacity requirements.

Table 2-2 shows the estimated water flow rates resulting from new residential and commercial development by growth area up to 2026. In the absence of clear indication of how Thames Water estimate future demand, it is not possible at this stage to assess whether Thames Water estimates are in line with the scale of projected growth in Camden.

[30] Thames Water: http://www.thameswater.co.uk/cps/rde/xbcr/corp/drwmp-04-london-dry-year.pdf accessed 18/04/2009.

Table 2-2: Future Water Demand in Camden's Growth Areas by Type of Development, 2006 to 2026

	Litres/Day	*2006-2011*	*2011-2016*	*2016-2021*	*2021-2026*	*Total (2006-2026)*
Kings Cross	Residential	24,989	349,112	275,614	-	649,715
	Non-Residential[31]	23,323	781,017	781,017	781,017	2,366,374
	Total	*48,312*	*1,130,129*	*1,056,631*	*781,017*	*3,016,089*
Euston	Residential	20,579	147,362	330,737	71,660	570,338
	Non-Residential	-	*12,977*	*252,232*	*239,255*	*504,464*
	Total	*20,579*	*160,339*	*582,969*	*310,914*	*1,074,802*
Tottenham Court Road	Residential	*51,448*	*70,190*	*55,490*	-	*177,128*
	Non-Residential	70,292	70,292	70,292	70,292	281,167
	Total	*121,740*	*140,482*	*125,782*	*70,292*	*458,295*
Holborn	Residential	-	16,537	-	-	16,537
	Non-Residential	46,859	46,859	46,859	46,859	187,438
	Total	*46,859*	*63,396*	*46,859*	*46,859*	*203,975*
West Hampstead Interchange	Residential	4,042	108,041	115,391	146,994	374,468
	Non-Residential	478	478	23,105	23,105	47,166
	Total	*4,520*	*108,518*	*138,496*	*170,100*	*421,634*
Other - South	Residential	530,650	628,401	431,796	483,979	2,074,825
	Non-Residential	169,068	169,068	169,068	169,068	676,273
	Total	*699,718*	*797,469*	*600,864*	*653,047*	*2,751,098*
Other - North East	Residential	461,195	293,254	238,866	244,378	1,237,692
	Non-Residential	10,543	36,497	26,116	13,138	86,294
	Total	*471,738*	*329,751*	*264,981*	*257,516*	*1,323,986*
Other - North West	Residential	244,378	157,284	131,192	124,578	657,432
	Non-Residential	11,841	11,841	11,841	11,841	47,362
	Total	*256,219*	*169,125*	*143,033*	*136,418*	*704,794*
Total	**Residential**	**1,337,281**	**1,770,179**	**1,579,087**	**1,071,589**	**5,758,136**
	Non-Residential	**332,403**	**1,129,029**	**1,380,530**	**1,354,575**	**4,196,537**
	Total	**1,669,684**	**2,899,209**	**2,959,616**	**2,426,164**	**9,954,673**

Source: URS calculations based on joint analysis by London Borough of Camden and URS Corporation.

2.5. Resulting Water Infrastructure Requirements

In light of the difficulties in liaising with Thames Water, it is not possible at this time to accurately forecast the physical infrastructure requirements associated with the projected growth. In particular, this is because identifying the infrastructure needs for growth critically depends upon understanding the context of both local and strategic protocols. In essence, the mains that serve the immediate local area will have a defined capacity and

[31] Commercial includes office, retail and leisure developments.

this will be able to afford supplies or not; the strategic mains are no different. Principally, it is feasible that one or other may be able to accommodate the growth whilst the other may not[32].

An increase in demand could result in the need for additional infrastructure both at the local level – e.g. additional mains serving the new development as well as improvements to the local distribution network – and at the strategic one. The scale of additional demand resulting from the additional residential and commercial development could mean that new water mains and pumping stations (or at least upgraded pumping stations) are required. As Thames Water is already planning for an additional reservoir and de-salination plant, it can be expected that additional resources will be adequate to support the projected growth.

Phasing

In the light of the absence of firm recommendations on water infrastructure requirements it is not possible to set out an infrastructure phasing plan at this time.

As discussed in **Section 2.4** residential and commercial growth can be expected to have an impact on the local infrastructure, on strategic one, or on both. Noting that the more strategic requirements will generally require longer lead in times, the study aimed to assess the point at which the system fails, or trigger points. So, as an example, it may be that the local mains can afford an extra 500 residential units but 501 requires a new main from location a to location b; of course, strategically, the capability may be significantly different so whilst the local mains are suitable for 500 units, the strategic capability may only be able to support, for instance, 200[33].

As is the case for sewerage (see **Section 5.5**), water infrastructure is planned and funded over five-yearly investment programmes. Currently Thames Water is undertaking Asset Management Plan (AMP) 4 which is 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 scope of this report extends to 2026 which is one year into the AMP 8 period of 2025-2030.

2.6. Funding

Thames Water, being the incumbent network operator, will be obliged to afford suitable water capacity utilising capital expenditure recovery mechanisms permitted via their operational licence issued by OFWAT. Whilst this is partly through customer bills and set by agreed capital expenditure programmes, there are direct contributions likely from developers.

[32] For the purposes of defining specific infrastructure requirements to accommodate growth, baseline criteria specific to Camden is required and this has not been forthcoming from Thames Water; as such, the potential impact of works are not identified at this stage.

[33] It is this understanding of likely works required to service the growth plans that Thames Water ideally would have responded to, but consultation with Thames Water has been inconclusive.

In certain areas of the UK, other water companies are charging what is effectively a 'roof tax' against each dwelling given that the infrastructure required is so significant. This has been approved by OFWAT and the process is underway; the benefit is that the infrastructure will be available for the developments as they 'go live'.

Thames Water have recently submitted proposals to OFWAT for the provision of network, be it replacement of assets or network reinforcement, that they perceive as being required to meet known growth plans for the period 2010 to 2015, and set against a Water Resource Management Plan that extends to 2035.

Growth over and above these projections may need to be paid for by third parties, i.e. developers, if the timeframes are within the review period as Thames Water will have already allocated their funds to the schemes they perceive as being necessary. If the development process goes beyond the OFWAT review period, then reinforcement schemes can be submitted for subsequent approval.

Up until recently, financial contributions from third parties would have been placed solely against local infrastructure with strategic works being funded via the OFWAT assessment. Over the last three years or so, other water companies have identified significant assets required to furnish supplies to new development and this has been charged via the 'roof tax' previously identified.

2.7. Summary

Summary of Infrastructure Requirements Assessment

As is the case for sewerage and other utilities infrastructure, for the reasons presented throughout the section it is not possible within this report to definitively conclude an assessment of specific infrastructure requirements for Camden between 2006 and 2026.

The scale of additional demand resulting from the additional residential and commercial development could require additional water mains and pumping stations (or at least upgraded pumping stations). As Thames Water is already planning for an additional reservoir and de-salination plant, it can be expected that additional resources will be adequate to support the projected growth. The additional amount of clear water required would equate to a football pitch sized reservoir. However, this does not account for Camden's specific spare capacity or shortages in current provision.

Thames Water are promoting significant schemes, such as the desalination plant at Beckton, to afford increased capacity noting that there is a predicted shortfall still remaining. At this juncture, a shortfall in capacity at a strategic level and a local level is plausible, as is the ability to deliver potable water to point of use. Information from Thames Water is vital to clarify this position.

Thames Water need to assess the impact of all growth against the baseline values they are currently operating to as this will then identify potential shortfalls. The report, whilst wishing to identify this, has yet to fully establish out turn positions.

Recommendations

So far it has not been possible to conclude specific infrastructure requirements arising from the projected residential and commercial growth in Camden.

The Council has attempted to engage with Thames Water to clarify their ability to furnish potable water supplies to growth plans and to include timeframes, cost implications and delivery risks / opportunities, so as to accord with PPS12.

As a result, as development progresses it is likely that further consultation with Thames Water will be required to establish local requirements (i.e. to individual development sites) as well as a more strategic understanding for the borough as a whole.

3. ENERGY (ELECTRICITY AND GAS)

3.1. Introduction and Overview

Scope

This section will review the existing energy networks (i.e. both the electricity and gas networks in Camden[34]) and the potential infrastructure implications of growth in residential and commercial development in Camden. Whilst it is difficult to definitively conclude an assessment of specific energy infrastructure requirements arising from the projected growth in domestic and non-domestic energy use, this section allows for a strategic interpretation of the potential implications for large scale infrastructure[35].

This report covers first tier infrastructure that is strategic for Camden as a borough. On-site infrastructure, whilst important, will be determined during the planning application process via the implementation of planning policies, specification aspirations and timing of the development. Typically, and particularly as policies start to gain momentum (Code for Sustainable Homes, London Mayoral aspirations etc), these factors will increasingly influence on site works.

Energy for Camden is afforded via a system of pipes or cables. These pipes or cables are laid under the streets of Camden and designed to give regulated pressure requirements and security.

An assessment of future infrastructure demand arising from growth cannot be undertaken without also considering the natural, or 'organic', growth in usage (infill development for example). In order to undertake this assessment, a thorough understanding of each energy network is required to ascertain if there is available spare capacity to accommodate further growth and demand. This is important so as to be able to establish an understanding of the risks and opportunities for delivering the proposed growth, which requires the input of the relevant utility network operators.

The growth anticipated for Camden, in the context of energy consumption, is significant and therefore the report aims to consider the use of combined heat and power (CHP) technology, i.e. low carbon technologies, to support the aspiration of a low carbon Camden. The Mayor is committed to cutting carbon dioxide emissions in London by 60% by 2025[36] and is delivering unprecedented levels of funding towards climate change

[34] While it would be possible to assess electricity and gas infrastructure requirements separately there are significant benefits in treating them together in this section as they are to some degree interchangeable sources of energy.

[35] The assessment of specific small scale infrastructure requirements arising from the projected growth in domestic and non-domestic energy use is discussed in **Section 3.9 Summary and Recommendations**.

[36] GLA (2009), *Rising to the Challenge, Proposals for the Mayor's Economic Development Strategy for Greater London*

programmes. The potential of delivering this ambition is seen as achievable by the delivery of the following programmes:

- 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 CO_2 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 and
- Turn waste into a resource through recycling or energy generation for London.

CHP technology is a key component in the delivery of this regional target, in that it offers an opportunity to achieve significant cuts in carbon dioxide emissions, and thus forms the major component for discussion in this section.

The overall intent is to establish the baseline energy consumption for Camden in terms of heat and electricity consumption densities; in addition, the likely implementation/phasing of decentralised energy systems will be considered when assessing the projected growth in domestic and non-domestic energy use for key growth areas in Camden for the following intervals: 2006 – 2011, 2011 – 2016, 2016 – 2021, and 2021 – 2026.

Whilst URS identifies that there is an opportunity to go a step further, i.e. identify potential CHP capacities for the growth areas when considering both the existing and projected growth in energy demand, the scope for this section is to deliver a strategic overview. This relates to matters such as: the likely phasing of decentralised energy systems based on the forecast growth in energy demand for the growth areas identified, implications for delivery, etc. Determining proposed CHP capacities is deemed to be beyond the scope of this strategic study and it is recommended that this is commissioned under a separate, more detailed study, which will allow URS to assess whether the borough is likely to align with both regional and national policies relating to climate change.

Management Arrangements and Responsibilities

EDF is the electricity network operator for Camden and they supply energy via a system of underground cables to each connection required. Historically, EDF was the London Electricity Board, which was privatised as part of a Government programme but has subsequently been absorbed into the EDF conglomerate.

For gas, the network operator is National Grid (historically nationalised as British Gas and more recently Transco) with a system broadly the same as EDF's but with pipes as opposed to cables.

Both National Grid (NG) and EDF manage their respective networks against the back drop of a regulatory process that is controlled by OFGEM. This process includes monitoring the success of each operator and those throughout the UK, measuring

performance via set criteria. The headlines for each network that is mostly visible to the general public include quality of supply and security of supply (people easily recall 'dim' lights or power cuts for example).

Regardless of the requirements arising from residential and commercial growth in Camden, both EDF and NG review their networks against known development that is derived from the general planning process and as part of the statutory consultee process. Subsequently, a capital expenditure programme is then prepared to match their obligations. The system however suffers from inherent weaknesses in that it encourages reactive management in many instances.

With regards to sustainable energy, a major vehicle driving the uptake of decentralised energy systems at the London level is the London Development Agency (LDA) and its Decentralised Energy Delivery (DED) Unit.

Camden's Energy Network

Historically, London Electricity Board (LEB) and British Gas Board afforded electricity and gas supplies to the borough. Since the mid 1980's both providers were privatised and, more recently, through acquisition and/or re-branding have become EDF Energy (electricity) and National Grid (gas).

For electricity, EDF is operational in what is known as 'LPN', or London Power Networks, where technical criteria are specifically set for this area as it is a system unique in the UK, recognising that security of supply is of utmost importance. The LPN zone covers some 665km^2 and employs circa 30,000km of cables, extending from SW14 in the west to Dartford in the east. Of course, Camden constitutes only a geographical component of the overall zone.

For gas, NG has a local management team that look after the 'North Thames LDZ' or local distribution zone. Whilst the technical requirements are identical to those of other areas, the working environment in the North Thames LDZ is wholly different in that the number of stakeholders, the level of coordination, and the intensity of energy consumption is far greater than most other provincial circumstances.

In both cases, the streets are congested both above and below ground to an extent that, particularly in the business areas', the options to work are very limited.

The expansion of each network has continued for many years with the last 40 years seeing an ever increasing demand for energy. The energy networks typically are designed for a 40 years life cycle although, of course, extending asset life is beneficial to the owners of the network as well as the wider environment in general.

Energy resources for Camden and the UK in general, are derived via a grid connected system that has mains of varying capacities and pressures that depend upon the strategic nature of the asset. A main for a side street in Camden is not going to be the same cross sectional area, or indeed pressure, as that of a main serving the whole borough.

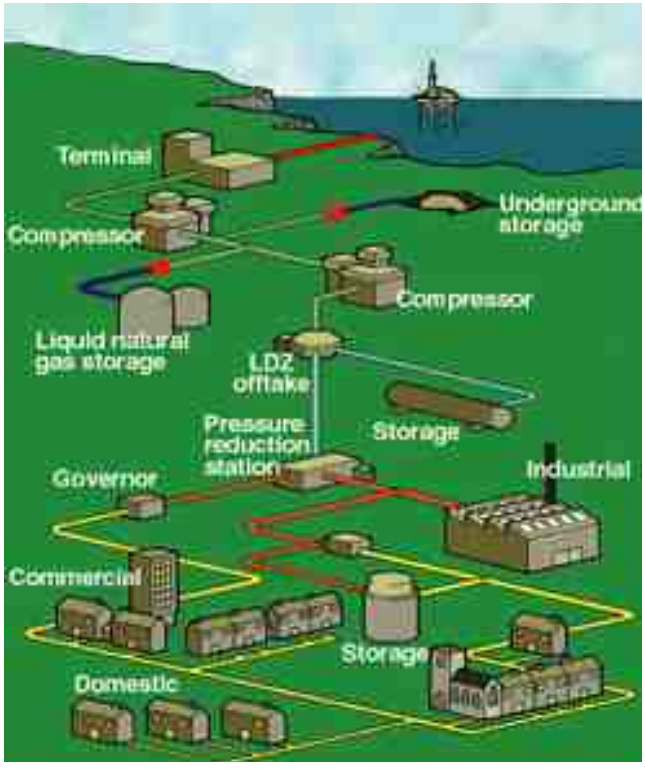
The gas and electricity infrastructure delivers energy to individual properties via mains and service pipes that are sized to reflect the requirement. The operational concept is that energy is drawn from each respective grid and subsequently transformed down to appropriate pressures.

Maintaining pressures is important for many technical reasons. From an end user point of view, the most obvious is that home appliances are designed to operate within defined criteria[37] and operating outside of this could cause damage to the unit or result in it operating ineffectively (low voltage causes a kettle to take longer to boil water for example).

Gas

National Grid have a system of mains throughout Camden that deliver gas to each connection point; in essence, gas is transported as shown in **Figure 3-1**, at different pressures but this is dependant upon the strategic nature of the asset.

Figure 3-1: Gas Network



Source: Replicated from National Grid: available at http://www.nationalgrid.com/uk/Gas/About accessed on 18/04/09.

[37] The basic national requirement is that gas is afforded at 21mB and electricity, assuming a single phase connection, 230 volts with a performance criteria of +10% -6%.

In Camden, the system operates at medium and low pressure[38]. The medium pressure network distributes gas to pressure reducing stations (PRS) located at various points within the borough and it is at this juncture that gas is subsequently reduced to a lower pressure. This low pressure network is the system that affords most residential supplies and some commercial requirements; for certain installations where gas demand is high (factories / large office facilities), there is however an ability to secure a medium pressure connection.

The gas capacity contained within the borough is projected by National Grid to provide sufficient energy without the need of upstream reinforcement, albeit it is worth noting that all utility networks are dynamic and subject to change at relatively short notice.

Electricity

Electricity wise, EDF operate a similar system to that of the gas in terms of distribution. In essence, electricity for Camden is broadly provided by an 11kV (11,000 volts) network that extends throughout the borough and connects into local substations. The substations subsequently transform the voltage from 11kV to 400V / 230V which is the voltage that is typically utilised in residential circumstances.

As with the gas, if there is a large energy user, the connection into the property could be 11kV and not the lower 'residential' value. Commercial applications, such as factories, large office facilities and supermarkets all fall within this category.

EDF Energy is currently reviewing the impact of growth within the borough and has yet to clarify the likely works required.

Policy and Regulatory Drivers

The Mayor's Climate Change Action Plan[39] demonstrates the Mayor's top priority for reducing London's carbon dioxide emissions is to move away from reliance on the national grid and on to a local, low carbon energy supply. This approach is often termed 'decentralised energy'.

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 energy systems by 2025, with the majority of London's energy being supplied in this way by 2050.

Camden's spatial vision is very much in keeping with the ambitions of the Mayor of London, and this vision is being developed and realised within Camden Council's *Core*

[38] The medium pressure network is locally strategic for the borough but not necessarily London whilst the low pressure is the local delivery network. In addition, there are intermediate and high pressure networks that operate up to 85bar provided this functions as strategic mains serving areas wider than Camden itself.

[39] GLA (2007), *The Mayor's Climate Change Action Plan*

Strategy Preferred Approach[40]. The Camden Core Strategy document reflects a similar spatial vision in that it requires all developments and developers to consider the following guidelines:

- Reducing carbon emissions from the redevelopment, construction and occupation of buildings by ensuring developments use less energy, making use of energy from efficient sources and the use of renewable energy
- A expectation that all developments will take measures to reduce the effects of, and adapt to, climate change and meet the highest feasible environmental standards during construction and occupation
- Setting Camden-specific targets on environmental performance including BREEAM, EcoHomes assessments as well as the Code for Sustainable Homes
- Working with partners and developers to implement decentralised energy networks in the parts of Camden most likely to support them, such as:
    - Housing estates with community heating or the potential for community heating
    - The growth areas of Kings Cross, Euston; Tottenham Court Road; West Hampstead Interchange and Holborn
    - Schools to be redeveloped as part of the Building Schools for the Future (BSF) programme
    - Existing or approved combined heat and power/decentralised systems[41].

This is further supported by the *Delivering a Low Carbon Camden* report[42]. This study illustrates that decentralised energy systems provide the most cost effective way for Camden to achieve its carbon reduction targets. The vision set out for Camden in the report is for a heating network served by a number of CHP based heat sources supplying a significant proportion of the borough. This is an ambitious, long term programme that requires careful planning now and sustained effort by Camden and its partners in order to be realised.

London's push for a decentralised, sustainable energy supply will include dramatically increasing the rollout of combined cooling, heat and electrical power energy infrastructure. Through the requirements of the *London Plan*[43] and *Planning Policy Statement: Planning*

[40] London Borough of Camden (2008), *Shaping Camden, Camden's Local Development Strategy, Core Strategy Preferred Approach*, as published for consultation in November 2008.

[41] Ibid, p. 47

[42] London Borough of Camden (2007), *Delivering a Low Carbon Camden*, *Carbon reduction scenarios to 2050*

[43] GLA (2008), *The London Plan, Spatial Development Strategy for Greater London, Consolidated with Alterations since 2004*

and Climate Change, *Supplement to Planning Policy 1*[44], December 2007, supplying energy efficiently is now essential for major developments. However, the bulk of the carbon dioxide emissions savings potential will need to be realised through supplying London's existing building stock[45].

As required under national guidance both EDF and National Grid submit their own growth plans to OFGEM, the regulator, to ensure that economic and environmental aspects are fully considered. Once the process has been reviewed and commented upon, the Secretary of State for Environment, Food and Rural Affairs (DEFRA) ultimately approves the final document. These five year plans ultimately serve to determine the capital expenditure that each company is committed to (for example, to replace existing assets or promote new capacity) as well as agreeing a formula to recover costs from end users.

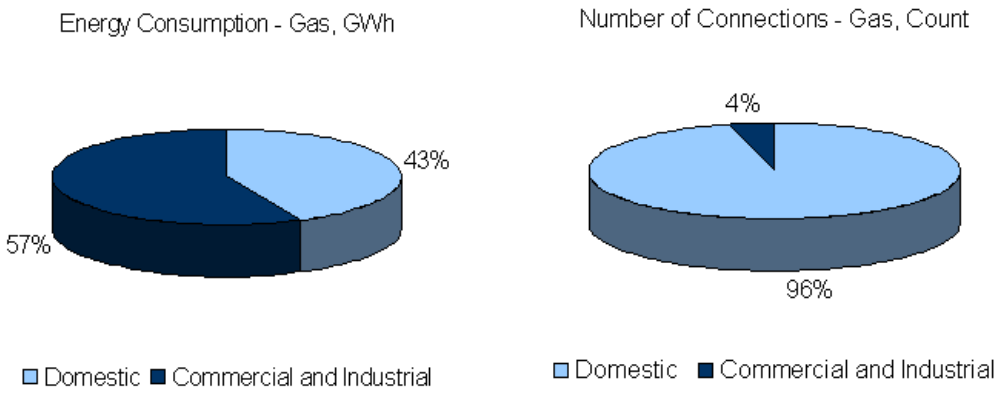
3.2. Existing and Committed Infrastructure

Existing Provision

Gas

The energy networks in Camden deliver substantial usage for both domestic and non domestic users alike. **Figure 3-2** shows both the number of connections and usage, both for Camden.

Figure 3-2: Current Gas Usage in Camden (2007)



Source: BERR via http://www.berr.gov.uk/energy/statistics/regional/regional-local-gas/page36200.html accessed on 18/04/09.

[44] CLG (2007), *Planning Policy Statement: Planning and Climate Change*, *Supplement to Planning Policy 1*, TSO

[45] This is fully discussed in **Section 3.9 Summary**.

Electricity

For the electricity network, EDF expect that energy consumed through their network will decrease if decentralised energy and the Code for Sustainable Homes impacts as predicted; however this is not a given[46].

EDF particularly note in their long term development statement that the potential to connect CHP systems to their network is proving increasingly difficult technically, particularly in the London area[47]. The difficulties that may arise are twofold for a CHP to be able to connect to the network. Firstly the network itself needs first of all to be of an adequate voltage, that is the voltage size of the network needs to be proportional to the amount of electricity generated by the CHP. Secondly the network needs to have enough capacity to take in the electricity that the CHP generates. In London the network is designed at a voltage which is not high enough to take in the CHP-generated electricity; and there is a risk that it may in any case not have spare capacity to take in the CHP-generated electricity.

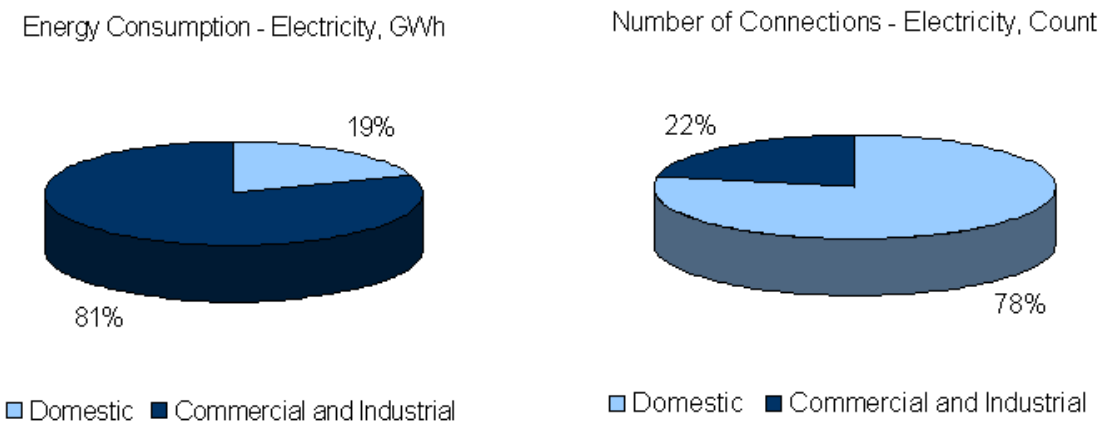
EDF are currently considering increasing the voltage on the London network. However they are also aware of the fact that an increased voltage also results in increased fault levels. This is a technical difficulty that the regulator cannot resolve. Ultimately it is for EDF to address it, and at this stage there is no certainty that they will be able to do so satisfactorily.

Figure 3-3 below present the baseline consumption figures for Camden.

[46] EDF Energy: http://edfenergynetworks.dialoguebydesign.net/docs/PlanningForTheFuture_Screen.pdf

[47] The high fault levels generated will, in all probability, prove too great for interconnection by small generators such as CHP, see **Section 3.7** for further discussions.

Figure 3-3: Current Electricity Usage in Camden (2007)



Source: BERR via http://www.berr.gov.uk/energy/statistics/regional/regional-local-electricity/page36213.html accessed on 18/04/09.

EDF and NG were requested to furnish details specifically for the borough but data has been limited but consultation has been inconclusive[48].

Planned Investment

Given the ageing networks, the requirement for each company is not only to develop capacity but also undertake significant asset replacements as the tendency to fail increases and their efficiency, and inherent safety, deteriorates. The greatest growth of gas network occurred in the 1960's and therefore, with most assets using a 40 year lifecycle, will need replacing in the short term. The electricity network also saw a second 'explosion' of growth during the 1990's and therefore the cycle will be repeated in future years.

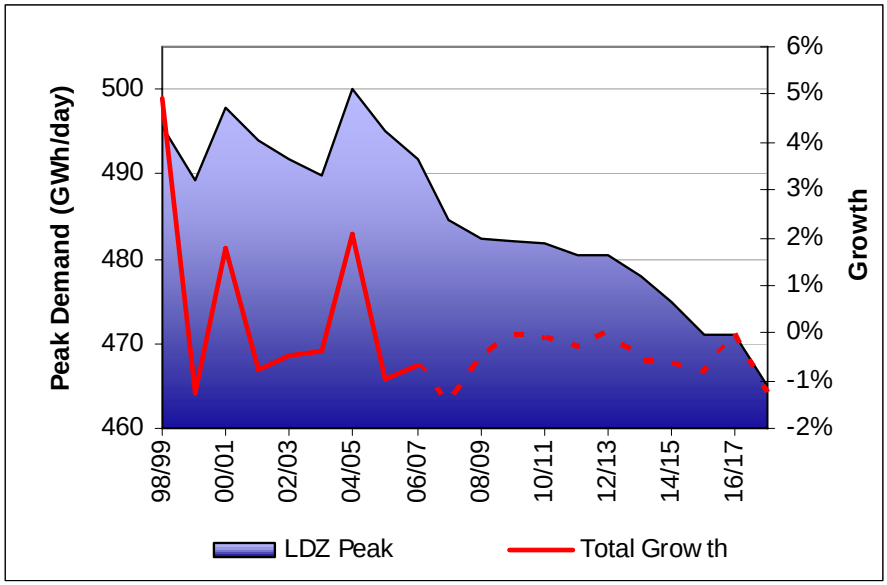
Gas

Based upon current forecasts, NG predict a growth of -1% for the North Thames distribution zone (see **Figure 3-4**) and therefore, on the basis that NG have identified that the projected load demand can be taken on the network without reinforcement, the planned investment for Camden is predominantly reflected in mains replacement. This is subject to stringent requirements by OFGEM as the capital expenditure programme is covered via the five yearly plan submitted to, and approved by, OFGEM[49].

[48] As for consultation with Thames Water, questions asked relate to existing system capability, plans for the borough at both local and strategic levels, as well as what would be required to deliver the aspirations of the revised growth figures.

[49] EDF Energy : http://edfenergynetworks.dialoguebydesign.net/bgo/background.asp accessed on 18/04/2009.

Figure 3-4: North Thames Gas Distribution Zone (Historical & Forecast 1 in 20 Peak Gas Demand)



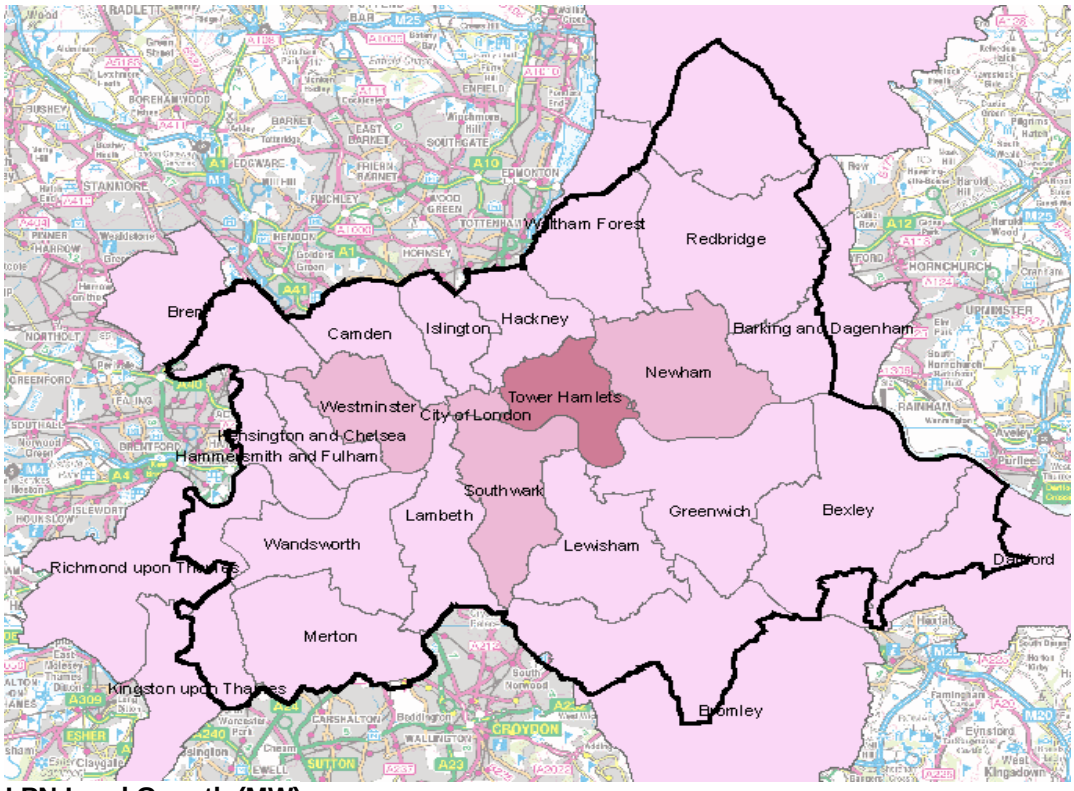
Source: National Grid, emailed data for NL LDZ

The likely impact of the Code for Sustainable Homes supports this in principle although the actual quantum is unknown and also noting that the increased desire for decentralised energy may well utilise gas as the primary energy source.

Electricity

Figure 3-5 below shows the LPN network, which represents the London area supplied by EDF (the black outline identifies the extent of the operational area). The adjacent pink areas are also under the control of EDF but are contained in adjacent licensed areas (SEEBoard and Eastern operational 'footprints').

Figure 3-5: EDF Prediction of Load Growth for 2007/2008



Source: EDF Energy: issued via email following presentation

EDF are understood to be currently reviewing the projected impact and investment specifically for Camden[50].

For both gas and electricity, data currently employed to develop projections of future load reflects that of historical consumption. However, the impact of the Code for Sustainable Homes and the desire to employ low or zero carbon technologies to furnish energy in Camden is somewhat of an unknown quantum and therefore is likely to be assessed with a degree of scepticism.

[50] Consultation with EDF, within the available timeframes for the study, was inconclusive.

Adequacy of Existing and Committed Infrastructure

Gas supplies in Camden are understood to be able to afford capacity provision and therefore the implications inferred are likely not to require additional provision; electricity, however, is likely to require a degree of reinforcement but the magnitude is not identified.

EDF do have a committed capital expenditure programme but the allocation specifically for Camden is not known at this juncture.

As with all central London boroughs, space in existing highway is extremely limited. Therefore works to replace mains are expensive and constrained, particularly when considering that other statutory bodies, such as water and telecommunication providers, are also under extreme pressure to maintain their own regulatory obligations.

As with works on water infrastructure, the delivery of improved or additional infrastructure is also subject to indirect pressures and requirements. Typically, they include pressure from local stakeholders whom are continually affected by excavations in highways, working hours restrictions and limited resources. The utility industry as a whole is already under-resourced and therefore major events such as the Olympics tend to exacerbate mains replacement programmes even further.

3.3. Meeting Existing Demand through Sustainable Energy

Camden has conducted extensive work to look at how the borough can cut its carbon emissions in line with national targets. In summary this work has concluded that

> *'The most cost effective way for Camden to meet its carbon reduction targets is through a community heating system served by combined heat and power (CHP)'*[51]*.*

In this context URS has examined the distribution of existing and future demand in order to understand how CHP could be deployed to meet the existing and future growth in energy demand.

This exercise has involved mapping work which demonstrates the baseline heat and electrical demand densities for the borough. The heat demand density is demonstrated on a per ward basis, and the electrical demand density is demonstrated on a per square kilometre basis.

Heat Demand Densities

The heat demand densities are mapped on a ward basis to demonstrate areas of high heat demand. This is illustrated for the domestic, commercial and industrial, and total uses within the borough[52].

[51] London Borough of Camden (2008), *Shaping Camden, Camden's Local Development Strategy, Core Strategy Preferred Approach*, as published for consultation in November 2008, p. 49

When analysing the domestic heat demand densities (**Figure 3-6**), it generally conforms to expectations:

- The housing estates in Gospel Oak, Haverstock and West Hampstead Interchange demonstrate medium heat demand densities
- The predominantly led domestic wards (Hampstead Town, Highgate, Frognal and Fitzjohns, Swiss Cottage, Kentish Town and Camden Town with Primrose Hill) demonstrating high heat demand densities
- The north west sub-area presents the predominant heat demand density for the borough, with the north east sub area following closely behind. This pattern seems reasonable in that the domestic use for the borough, other than the housing estates, is concentrated away from the south sub area, which is predominantly commercial and industrial use led (see **Figure 3-7**).

When analysing the commercial and industrial heat demand densities (**Figure 3-7**), again it generally conforms to expectations:

- The predominantly led commercial and industrial wards (Bloomsbury, and Holborn and Covent Garden) demonstrate high heat demand densities
- The south sub area illustrates the predominant heat demand density for the borough
- The north west sub area show medium heat demand densities in the south of the Frognal and Fitzjohns, and Hampstead Town wards

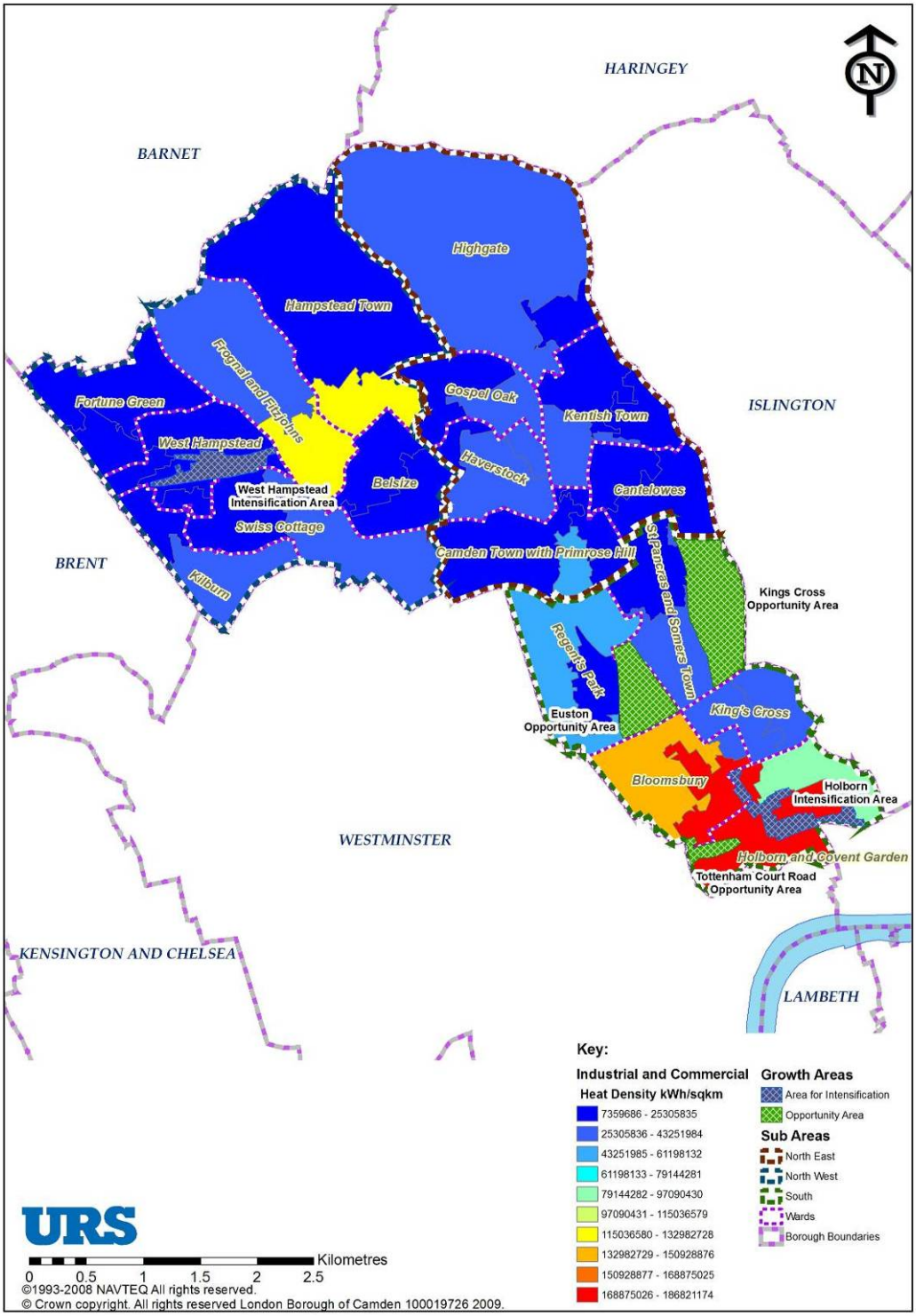
This pattern seems reasonable in that the commercial and industrial use for the borough is concentrated away for the north east and north west sub-areas, which are predominantly domestic use led.

Figure 3-8 shows the total heat demand densities when considering together the domestic, commercial and industrial uses within the borough. This mapping exercise clearly demonstrates that the heat demand densities are predominantly led by the commercial and industrial uses within the borough.

Figure 3-8 reflects a very similar heat demand density to that of **Figure 3-7**. This indicates that the heat demand profile of the commercial and industrial uses within the borough is significantly higher than the domestic uses; circa three times greater in terms of kWh/km^2.

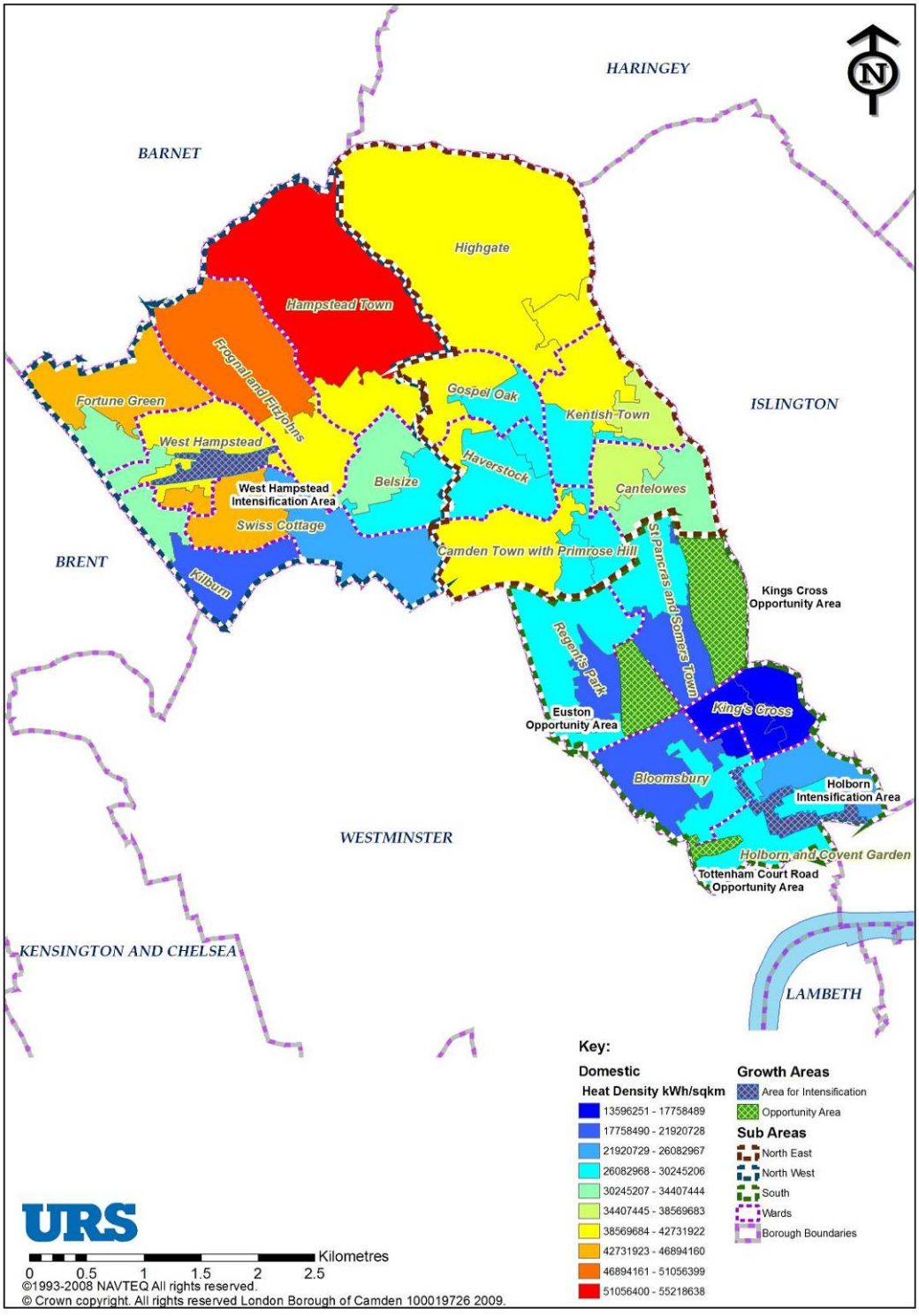
[52] The mapping exercise is undertaken on a ward basis. This is due to the baseline heat demand densities being provided on this basis. The colour range is provided to allow an easy visual interpretation of the heat demand densities and is indicative only of the relative density of demand compared to other areas.

Figure 3-6: Baseline Heat Demand Density Maps for Domestic Uses



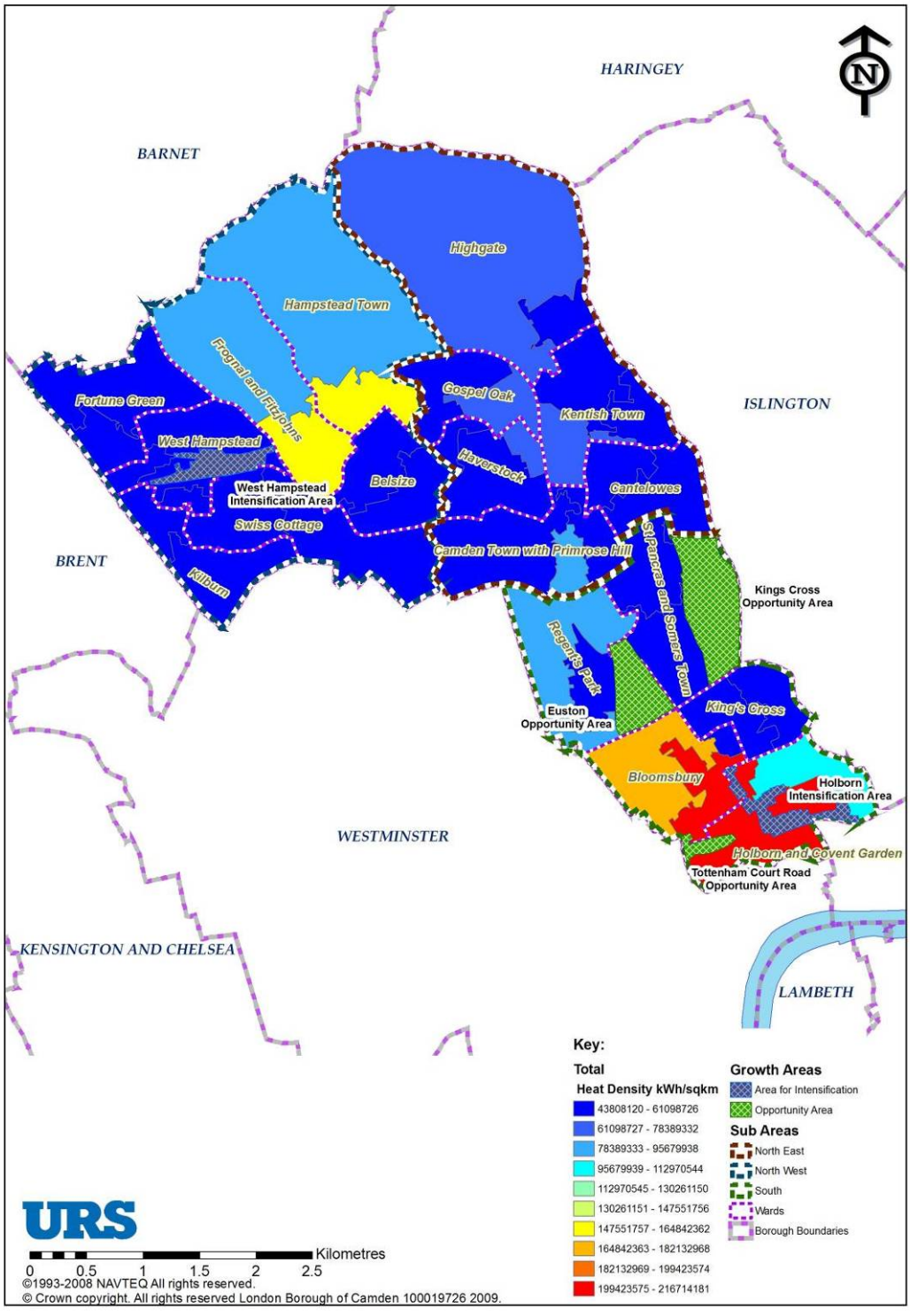
Source: URS analysis of BERR data

Figure 3-7: Baseline Heat Demand Density Maps for Commercial and Industrial Uses



Source: URS analysis of BERR data

Figure 3-8: Baseline Heat Demand Density Map for Total Uses of the Borough



Source: URS analysis of BERR data

Electrical Demand Densities

The electrical demand densities are mapped on a square kilometre basis to demonstrate areas of high electrical demand. This is illustrated for the domestic, commercial and industrial, and total uses within the borough[53].

When analysing the domestic electrical demand densities (**Figure 3-9**), the central Camden wards (West Hampstead, Hampstead Town, Haverstock, Frognal and Fitzjohns, Belsize, Swiss Cottage, Kentish Town, Cantelowes, Fortune Green, Kilburn, and Camden Town with Primrose Hill) present medium to high electrical demand densities. This illustrates the greater density of housing within these wards (including the housing estates in the Gospel Oak, Haverstock and West Hampstead Interchange areas) significantly influence the electrical demand densities. This pattern seems reasonable in that the domestic use for the borough is concentrated in the central Camden wards. This is further supported by **Figure 3-10**, which illustrates the south sub region is predominantly commercial and industrial use led.

When analysing the commercial and industrial electrical demand densities (**Figure 3-10**), again it generally conforms to expectations:

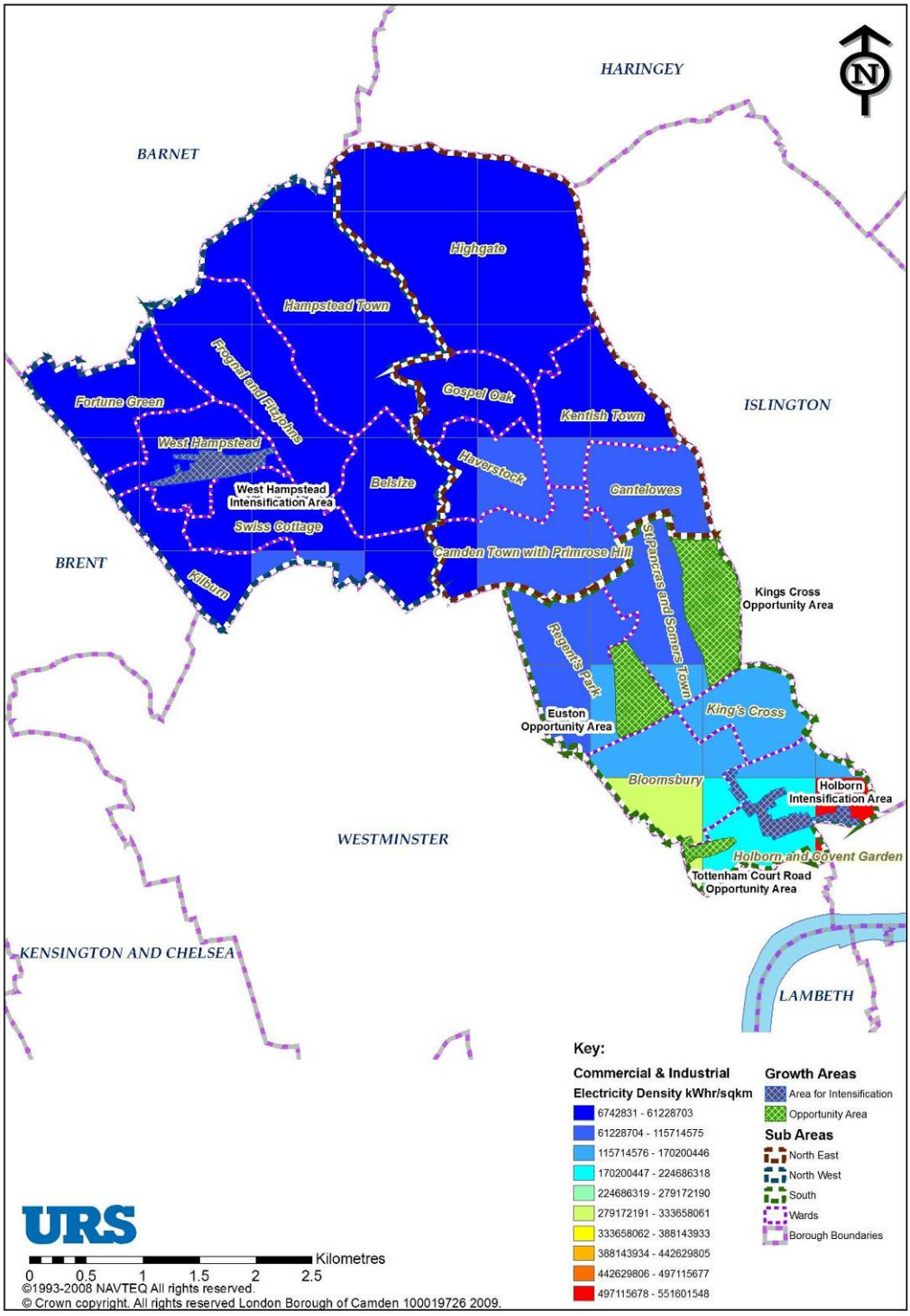
- The predominantly led commercial and industrial wards (Bloomsbury, King's Cross, Holborn and Covent Garden, and in the south of the Regent's Park, and St Pancras and Somers Town wards) demonstrate medium to high heat demand densities
- The south sub-area illustrates the predominant heat demand density for the borough
- The north west and north east sub-area present low heat demand densities.

This pattern seems reasonable in that the commercial and industrial use for the borough is concentrated away for the north east and north west sub areas, which are predominantly domestic use led.

Figure 3-10 demonstrates the total electrical demand densities when considering both the domestic, and commercial and industrial uses within the borough. This mapping exercise clearly demonstrates that the electrical demand densities are predominantly led by the commercial and industrial uses within the borough. **Figure 3-10** reflects a very similar electrical demand density to that of **Figure 3-10**. This indicates that the electrical demand profile of the commercial and industrial uses within the borough is significantly higher than the domestic uses; circa 15 times greater in terms of kWh/km^2.

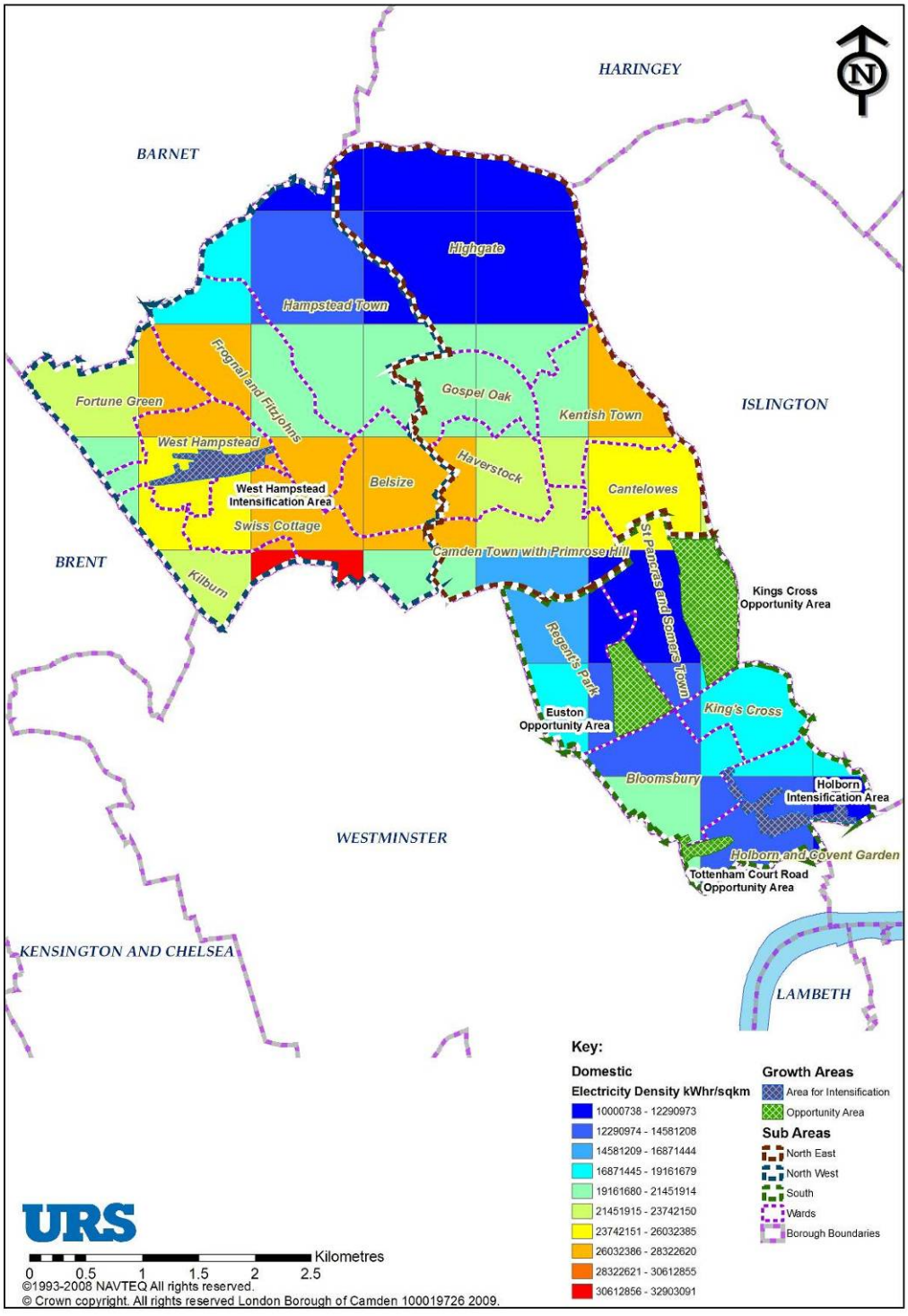
[53] The mapping exercise is undertaken on a square kilometre basis. This reflects the source of the data used for this exercise, which was supplied by LBC (the data is obtained from Delivering a Low Carbon Camden" April 2007, LB Camden). The colour range is provided to allow an easy visual interpretation of the electrical demand densities and is indicative only of the relative density of demand compared to other areas.

Figure 3-9: Baseline Electrical Demand Density Maps for Domestic Uses



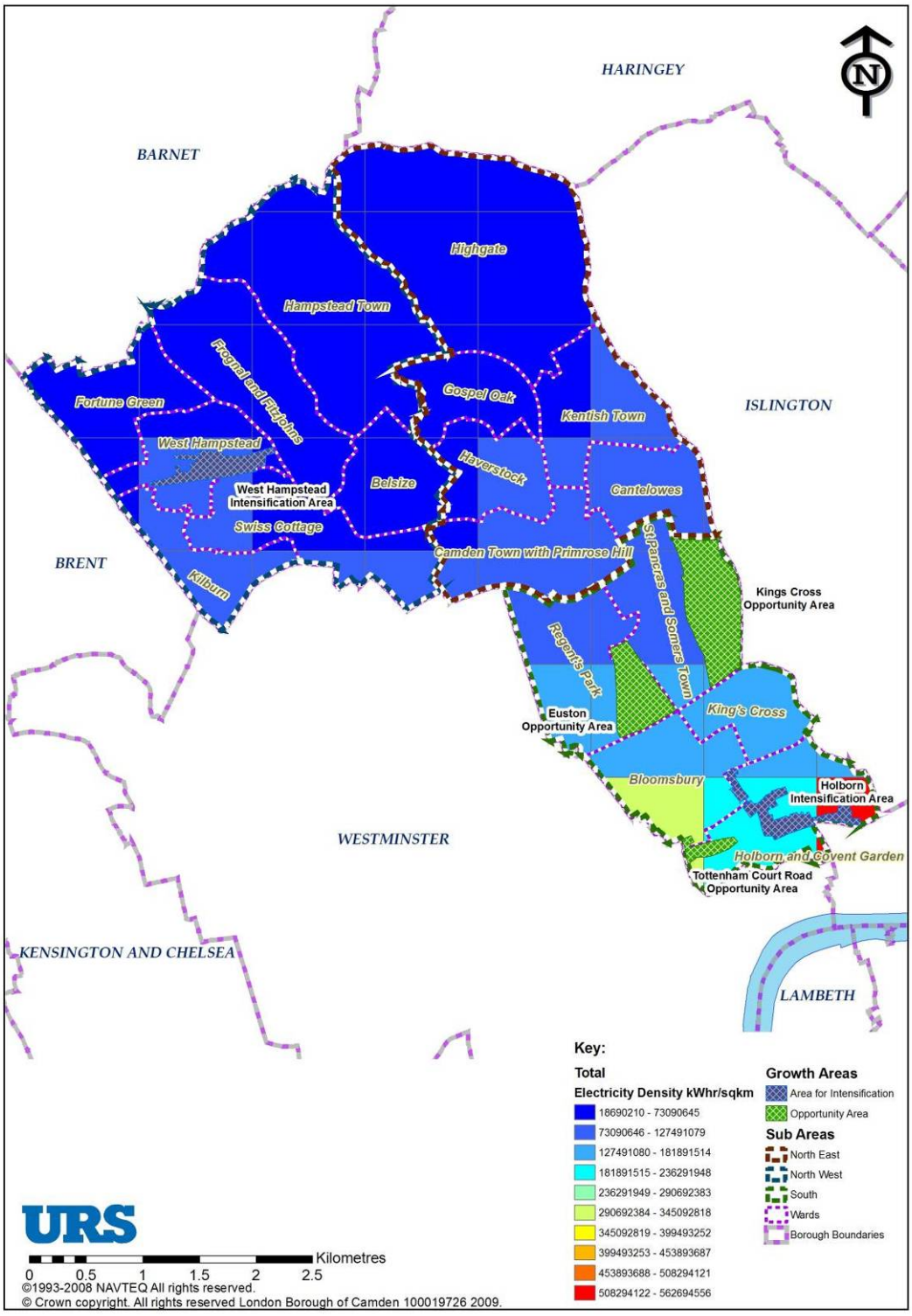
Source: URS analysis of URS analysis of ONS/BERR and Camden Council data

Figure 3-10: Baseline Electrical Demand Density Maps for Commercial and Industrial Uses



Source: URS analysis of URS analysis of ONS/BERR and Camden Council data

Figure 3-11: Baseline Electrical Demand Density Map for the Total Uses of the Borough



Source: URS analysis of URS analysis of ONS/BERR and Camden Council data

Analysis

Figure 3-8and **Figure 3-11** illustrate the total heat and electrical demand densities when considering the domestic, and commercial and industrial uses within the borough, respectively. They show similar demand densities with the commercial and industrial led uses demonstrating significantly higher demand densities than the domestic uses. As a result, the location of commercial and industrial uses should be considered to lead the consideration of locating decentralised energy systems in Camden.

The predominant areas of medium to high heat and electrical demand profiles are:

- Holborn and Covent Garden
- Bloomsbury
- King's Cross
- Regent's Park
- St Pancras and Somers Town
- West Hampstead
- Camden Town with Primrose Hill
- Frognal and Fitzjohns
- Hampstead Town.

These areas indicate the most feasible locations for implementing decentralised energy systems, i.e. geographical areas where there is a significant heat and electrical demand, which is necessary to support combined heat and power systems.

The mapping exercise supports the Council's spatial strategy in delivering residential and commercial growth in Camden, as there is an overlap in terms of the predominant areas identified with medium to high heat and electrical demand profiles with those identified in Camden Council's *Core Strategy Preferred Approach*. The issue is further discussed in **Section 3.7.**

3.4. Estimating Future Demand

Provision Standard

To secure a basic understanding of the system capabilities, each type of additional development requirement will need to have recognised energy consumption demand placed against it, noting the impact of the Code for Sustainable Homes discussed in the **Issues / Future Trends** section below.

The resulting consumption figures will facilitate projections of energy demand against historical data so that shortfalls and/or excess can be considered. At this stage, both EDF and NG have yet to comment on the demand projections to establish their viability.

Regardless of the figures utilised, outturn figures will however only proffer likely engineering requirements as, until a formal design is completed against set network criteria, the energy systems, given their 'dynamic' nature, are always subject to change and re-configuration. In saying that, 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.

Table 3-1 identifies the initial electrical and gas computations utilised in the Camden Infrastructure Model.

Table 3-1: Gas and Electricity Provision Standards

		Provision Standard	
Development		***Gas***	***Electricity***
Residential		1 m^3 per hour per dwelling[54]	1.6 kVA per dwelling
Commercial	Offices	0 m^3 per hour per sqm	0.08 kVA per sqm
	Retail and Leisure	0.01 m^3 per hour per sqm	0.12 kVA per sqm

Source: All figures are typical utility company figures for both development design and strategic planning; it should be noted that the strategic planning figures change with volume and the information is not published as it is commercially sensitive.

Current electrical computations for residential dwellings utilise a simple basis of assessment which generally only distinguishes between electrically heated dwellings and non-electrically heated dwellings. For commercial application, this can be broadly broken down into floorspace and type albeit an office will attract an energy profile different to that of a small shop[55].

For gas, there is a difference in approach although the systems are broadly similar; for residential gas computations, the energy will broadly be designed on a consumption rate of 1m^3 of gas per dwelling. Commercial requirements vary greatly as the application of energy is so diverse; an office facility, if using gas as opposed to air conditioning will have a completely different footprint to that, say, of a swimming pool whilst the floor area may well be identical.

[54] This is an average between design figures of 1.13, 0.79 and 0.51, for a low, medium and high density residential development respectively with gas central heating.

[55] Diversity is applied but this is not based upon published information as the utility industry is somewhat self regulating, with performance measurement being the basis of assessment as opposed to detailed technical connection data. It is noteworthy that figures utilised for a single development will inherently be different to that of the whole borough given that diversity does differ. As a single example, a residential dwelling using gas central heating in a, say, 100-dwelling development will have a baseline design criteria of 2kVA - there is a very distinct difference between M&E assessment and utility assessments, in this instance M&E consultants will normally apply a figure closer to 12kVA. For the strategic network in Camden, this 2kVA figure may be 1.4kVA; for the strategic network across London, this may reduce further to, say, 0.8kVA.

Issues/ Future Trends

Added into the complexity of network assessment is the desire to become more energy efficient and an acceptance that energy is a valuable commodity.

The Code for Sustainable Homes

The Code for Sustainable Homes (CfSH) aspires to a decrease in energy consumption for new domestic developments via the suitable application of building materials (with regards to insulation and glazing performance, and passive design measures) and an encouragement to utilise energy efficient services. Data is not yet available and therefore assumptions will need to be made in order to project likely impact on deliverability. For the purposes of the study, please note that no allowance has been made for CfSH. Part of this reasoning is reflected in the balance of certain improvements that the CfSH will bring to that of the wider population whom generally aspire to a more affluent lifestyle. The CfSH may afford savings if the status quo remained but, in all reality, this is unlikely to be case.

Energy Consumption Trends

National Grid are anticipating a negative growth period (see **Figure 3-4** in **Section 3.2**) of -1% for the Camden area, noting that high unit prices, the pressure to utilise more efficient appliances and the potential impact of the CfSH are all likely to influence matters.

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.

However, whilst a negative growth in gas consumption is anticipated, an increase in demand is expected for electricity (see Box below).

Efficient Appliances and Inefficient Behaviours

The CfSH requires appliances, such as washing machines and refrigerators, to be energy efficient so that energy consumed is kept to a minimum. There is also a wider tendency to encourage this trend for the general population when replacing old appliances given that the CfSH does not currently apply to existing housing stock.

The CfSH policy, and the wider political will, assumes to a certain extent that the status quo remains – i.e. population habits and aspirations don't change. In reality, modern life involves a far greater use of technology that, whilst individually doesn't have a huge impact, negates some of the Government committed environmental targets.

For instance, people nowadays have mobile telephones that need charging, computers, televisions (probably in more than one room), a refrigerator for food, etc. – the list is long but the trend is a greater reliance upon electricity and not necessarily less.

Another example is that of television: 20 years ago, a single television would most likely have served a home. It is now quite normal for a property to have several televisions, as well as Sky or Freeview digiboxes as well as games consoles. Whilst this is not a criticism of modernity, there is an inherent consequence on the utility networks.

As climate change begins to take a toll, the requirement to provide air conditioning becomes more prevalent in the market, both for non-domestic and domestic applications. This is another contributing factor.

Decentralised Energy Generation and CHP

Camden's emerging *Core Strategy* places a strong emphasis on the implementation of decentralised energy networks at appropriate locations throughout the borough. Decentralised energy networks are recognised as one of the key means to achieve its core objective of promoting a sustainable Camden and tackling climate change. The opportunities to deliver CHP to meet the additional energy demand deriving from the projected residential and commercial growth in Camden are substantial and are discussed in **Section 3.7**. The section also discusses some of the practicalities of implementing CHP systems.

3.5. Energy Demand arising from Growth

EDF and National Grid are obliged to afford capacity provision utilising capital expenditure recovery mechanisms permitted via their operational licence issued by OFGEM. They are expected to be the primary funder of any necessary works, partly through customer bills and set by agreed capital expenditure programmes, but also by means of direct contributions from developers.

Typically, the utility industry works on reactive processes that use specific data provided at the design stage to achieve an engineering proposal.

Current estimates, using basic assessment techniques, identify an increase in energy consumption, based upon the status quo, of approximately 77MVA of electricity and 14,000m^3 of gas. **Table 3-2** and **Table 3-3** show the estimated demand resulting from domestic and non-domestic development by growth area up to 2026.

Both EDF and NG have not confirmed the benchmark figures of growth that they have employed when computing their own capacity requirements.

Table 3-2: Future Electricity Demand in Camden's Growth Areas by Type of Development, 2006 to 2026

	kVA	*2006-2011*	*2011-2016*	*2016-2021*	*2021-2026*	*Total (2006-2026)*
Kings Cross	Residential	109	1,520	1,200	-	2,829
	Non-Residential	431	9,653	9,653	9,653	29,392
	Total	*540*	*11,173*	*10,853*	*9,653*	*32,221*
Euston	Residential	90	642	1,440	312	2,483
	Non-Residential	-	240	3,228	2,988	6,455
	Total	*90*	*882*	*4,668*	*3,300*	*8,938*
Tottenham Court Road	Residential	224	306	242	-	771
	Non-Residential	869	869	869	869	3,475
	Total	*1,093*	*1,174*	*1,110*	*869*	*4,246*
Holborn	Residential	-	72	-	-	72
	Non-Residential	579	579	579	579	2,317
	Total	*579*	*651*	*579*	*579*	*2,389*
West Hampstead Interchange	Residential	18	470	502	640	1,630
	Non-Residential	9	9	284	284	585
	Total	*26*	*479*	*786*	*924*	*2,215*
Other - South	Residential	2,310	2,736	1,880	2,107	9,034
	Non-Residential	2,072	2,072	2,072	2,072	8,286
	Total	*4,382*	*4,808*	*3,952*	*4,179*	*17,320*
Other - North East	Residential	2,008	1,277	1,040	1,064	5,389
	Non-Residential	136	616	424	184	1,361
	Total	*2,144*	*1,893*	*1,464*	*1,248*	*6,750*
Other - North West	Residential	1,064	685	571	542	2,862
	Non-Residential	160	160	160	160	641
	Total	*1,224*	*845*	*732*	*703*	*3,504*
Total	**Residential**	**5,822**	**7,707**	**6,875**	**4,666**	**25,070**
	Non-Residential	**4,256**	**14,199**	**17,269**	**16,789**	**52,513**
	Total	***10,079***	***21,906***	***24,144***	***21,455***	***77,583***

Source: URS calculations based on joint analysis by London Borough of Camden and URS Corporation.

Table 3-3: Future Gas Demand in Camden's Growth Areas by Type of Development, 2006 to 2026

	m3/Hour	*2006-2011*	*2011-2016*	*2016-2021*	*2021-2026*	*Total (2006-2026)*
Kings Cross	Residential	55	772	609	-	1,436
	Non-Residential	36	271	271	271	849
	Total	*91*	*1,043*	*880*	*271*	*2,285*
Euston	Residential	45	326	731	158	1,261
	Non-Residential	-	20	109	89	217
	Total	*45*	*346*	*840*	*247*	*1,478*
Tottenham Court Road	Residential	114	155	123	-	392
	Non-Residential	24	24	24	24	98
	Total	*138*	*180*	*147*	*24*	*489*
Holborn	Residential	-	37	-	-	37
	Non-Residential	16	16	16	16	65
	Total	*16*	*53*	*16*	*16*	*102*
West Hampstead Interchange	Residential	9	239	255	325	828
	Non-Residential	1	1	8	8	17
	Total	*10*	*240*	*263*	*333*	*845*
Other - South	Residential	1,173	1,389	955	1,070	4,586
	Non-Residential	55	55	55	55	221
	Total	*1,228*	*1,444*	*1,010*	*1,125*	*4,807*
Other - North East	Residential	1,019	648	528	540	2,736
	Non-Residential	5	44	29	9	87
	Total	*1,024*	*693*	*557*	*549*	*2,823*
Other - North West	Residential	540	348	290	275	1,453
	Non-Residential	7	7	7	7	27
	Total	*547*	*354*	*297*	*282*	*1,481*
Total	**Residential**	**2,956**	**3,913**	**3,491**	**2,369**	**12,729**
	Non-Residential	**144**	**439**	**519**	**479**	**1,580**
	Total	***3,100***	***4,352***	***4,009***	***2,848***	***14,309***

Source: URS calculations based on joint analysis by London Borough of Camden and URS Corporation.

3.6. Resulting Energy Infrastructure Requirements

In light of the difficulties in liaising with both EDF and National Grid it is not possible at this time to accurately forecast the physical infrastructure requirements associated with the projected growth. As with water, this is due to the fact that identifying the infrastructure needs for growth critically depends upon understanding the context of both local and strategic requirements. In essence, mains that serve the immediate area will have a defined capacity and the assessment will consider their ability to cater for further capacity requirements. The strategic mains are no different and it is feasible that only one may be able to accommodate the growth agenda.

However, based on forecast demand it is possible to gauge the quantum of energy infrastructure that is indicative of the scale of the infrastructure needed to support such levels of growth in Camden up to 2026, but does not incorporate detailed considerations of existing spare capacity. For electricity this includes in the region of 3 primary substations (converting electricity typically from 33kV to 11kV), upgrading or establishing one new grid site (converting electricity typically from 132kV to 33kV) and up to 77 1MVA substations (i.e. secondary substation catering for local demand). The specific requirements for electricity sub-stations may risk delaying development unless they are adequately planned for. The reason for this rests firstly in the space demands for both primary (generally of 40 by 40 metres) and secondary sub-stations (generally 4 by 4 metres). Additionally there planning for substations must consider the need of constant and unlimited (24/7) accessibility, space for accessibility with equipment, and controlling for vibrations, noise, risks of explosion and other health and safety issues.

For gas, the 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, there may be a requirement for the equivalent of 2 to 3 pressure reducing stations (transforming the gas from medium pressure to low pressure).

Phasing

As for the assessment of the implications of growth on water infrastructure, in the light of the absence of firm recommendations on energy infrastructure requirements it is not possible to set out an infrastructure phasing plan at this time.

All growth will impact upon local infrastructure and the strategic network. Noting that the more strategic requirements will generally require longer lead in times, the study aimed to assess the point at which the system fails.

The design of the system will establish a point at which it will fail technically so, as an example, it may be that the local mains can afford an extra 500 residential units but the 501st requires a new main from location a to location b; of course, strategically, the capability may be significantly different so whilst the local mains are suitable for 500 units, the strategic capability may only be able to support, say, 200.

The ability to understand the trigger points is what will determine the level of reinforcement required. From current assessments and on the basis that National Grid report favourable capacity provision, the likelihood is that major improvement works are not necessary for the gas network; however, the electricity network is anticipated to require upstream reinforcement – discussions with EDF remain ongoing.

Energy infrastructure is planned and funded over five-yearly investment programmes. Currently, EDF are submitting plans for the period 2010 to 2015 and this process will be repeated in 2014 for the period 2015-2020.

For both networks, elements of reinforcement may already be planned however as part of an internal process whereby asset replacement programmes necessitate the need to replace apparatus.

3.7. Meeting Future Demand through Sustainable Energy

Meeting the future energy demand through decentralised energy systems is essential in driving the ambition of a low carbon London. By simply moving energy generation and supply from distant large scale power stations to local decentralised energy systems, carbon dioxide emissions can be significantly reduced due to improved operational efficiencies. This is a result of being able to utilise the heat energy, a by-product of electrical power generation, for the surrounding area (heat network infrastructure) where otherwise it would be dumped, and reduced grid losses due to local distribution of electrical power. Thus, even in instances of business as usual, provided heat and electrical power can be met through decentralised energy systems, significant carbon dioxide emissions savings will result.

The overall decentralised energy ambition for Camden should be compliance with the Mayor's *Climate Change Action Plan*[56], i.e. enable a quarter of the borough's energy supply to be moved off the grid and on to local, decentralised energy systems by 2025.

Geographical areas that demonstrated medium to high densities of heat and electrical demand profiles were identified in **Section 3.3**. It has been further shown that there is an overlap in terms of the growth areas and the areas identified with medium to high heat and electrical demand profiles when considering the baseline energy demand analysis. In this section we further discuss how decentralised energy systems could likely be implemented and phased when assessing the projected domestic and non-domestic growth in the growth areas for the following intervals: 2006 – 2011, 2011 – 2016, 2016 – 2021, and 2021 – 2026.

Forecast Electrical Demand

The mapping exercise based on **Table 3-2**, illustrated in **Figure 3-12** to **Figure 3-16**, allows an interpretation of the projected domestic and non-domestic electrical demand growth for the growth areas.

Based on the expected residential and commercial growth trajectory presented in **Section 1**, the West Hampstead Interchange, Holborn and Tottenham Court Road growth areas present a low electrical demand growth over the 2006 – 2026 forecast period.

Euston growth area shows a low electrical demand growth over the 2006 – 2016 forecast periods, and a medium electrical demand growth over the 2016 – 2026 forecast periods.

King's Cross demonstrates a medium to high electrical demand growth over the 2006 – 2026 forecast periods.

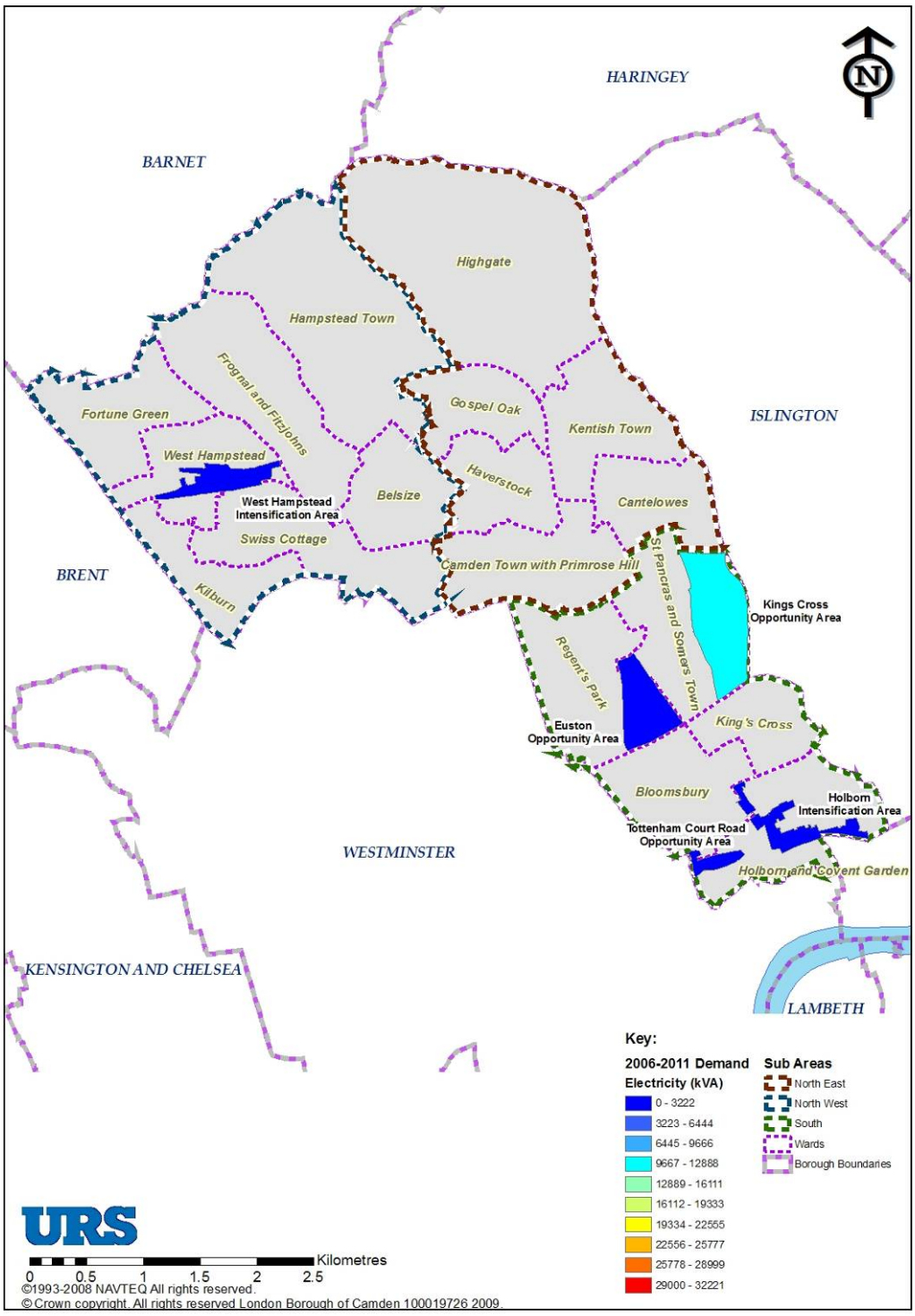
[56] Mayor of London (2007), *Action Today to Protect Tomorrow: The Mayor's Climate Change Action Plan*, GLA.

When considering the total projected domestic and non-domestic electrical demand growth for the 2006 – 2026 forecast periods, the King's Cross growth area shows the greatest growth in electrical demand (see **Figure 3-16**). **Table 3-2** illustrates that this growth is predominantly led by the commercial and industrial uses within the growth area.

The Euston and Tottenham Court Road growth areas show a medium growth in electrical demand. Again, **Table 3-2** illustrates that this is mostly due to the commercial and industrial growth, especially for over the 2016 – 2026 forecast periods.

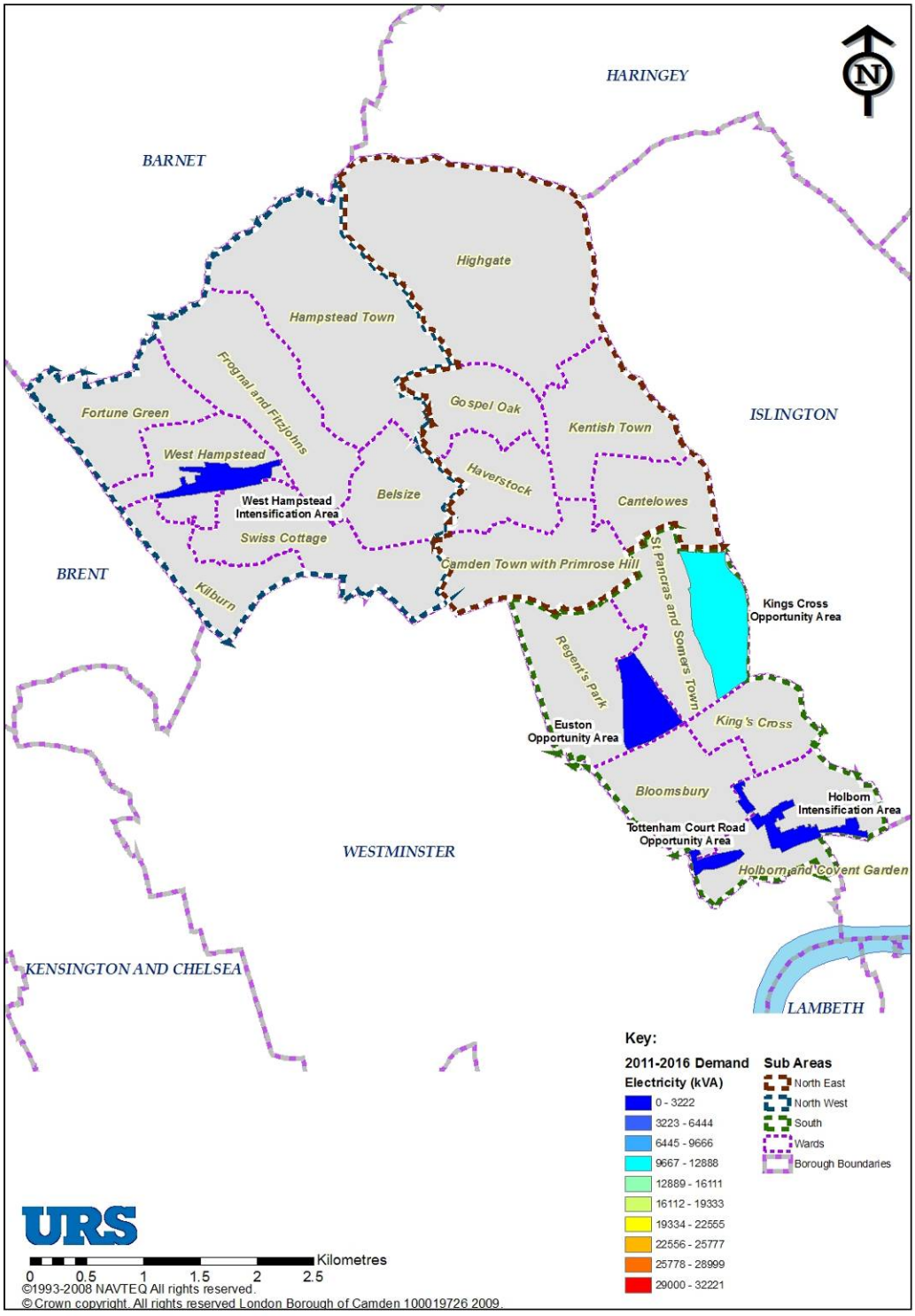
West Hampstead Interchange and Holborn present the lowest growth in electrical demand. This is significant, as **Table 3-2** illustrates that this growth is predominantly led by the domestic uses within the areas of intensification. This explains the low projected growth as the other key geographical areas considered are predominantly led by the commercial and industrial uses.

Figure 3-12: Projected Electrical Demand Growth Map, by Growth Area, over Time Interval of 2006 – 2011, kVA.



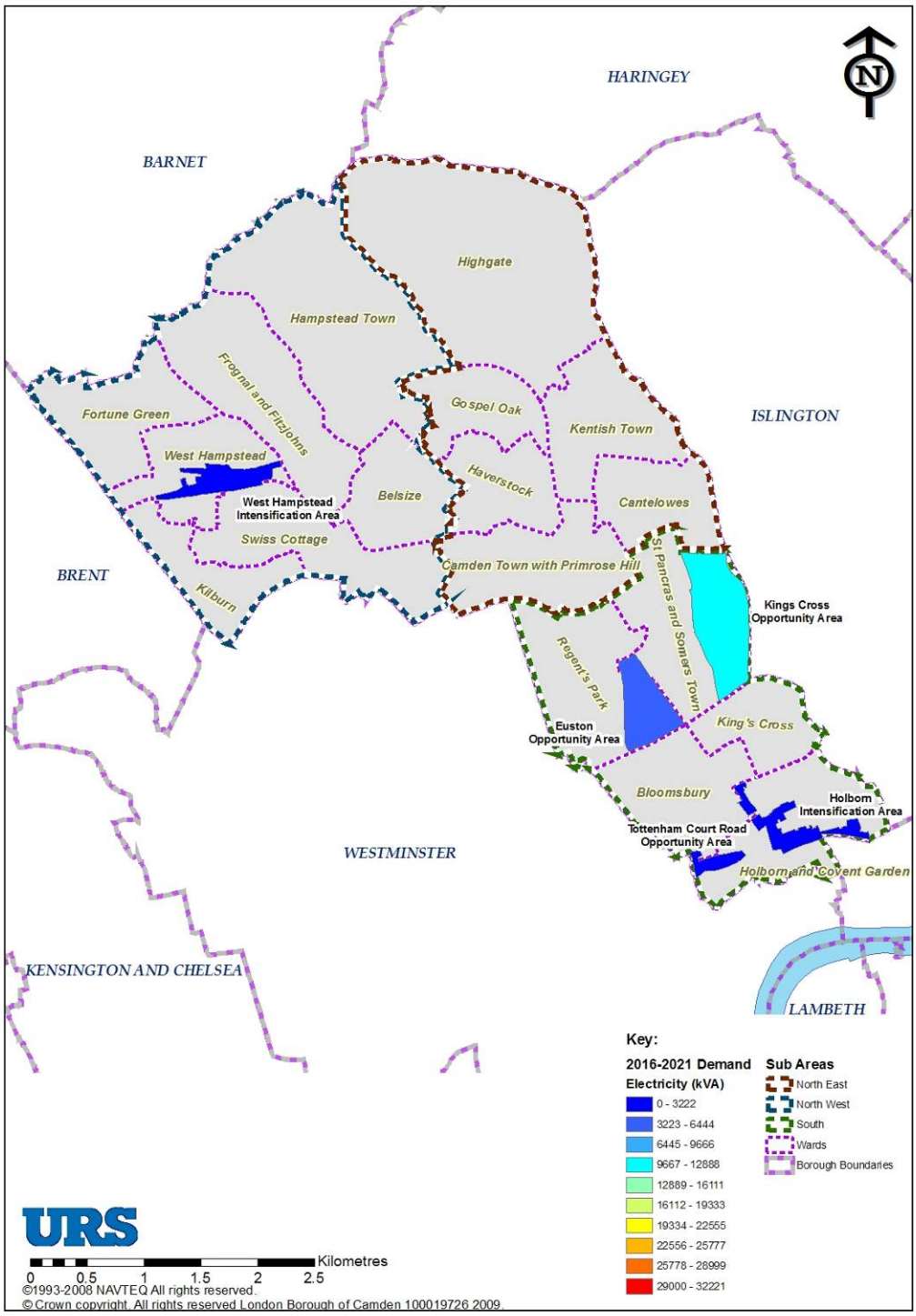
Source: URS based on joint analysis by London Borough of Camden and URS Corporation

Figure 3-13: Projected Electrical Demand Growth Map, by Growth Area, over Time Interval of 2011 – 2016, kVA.



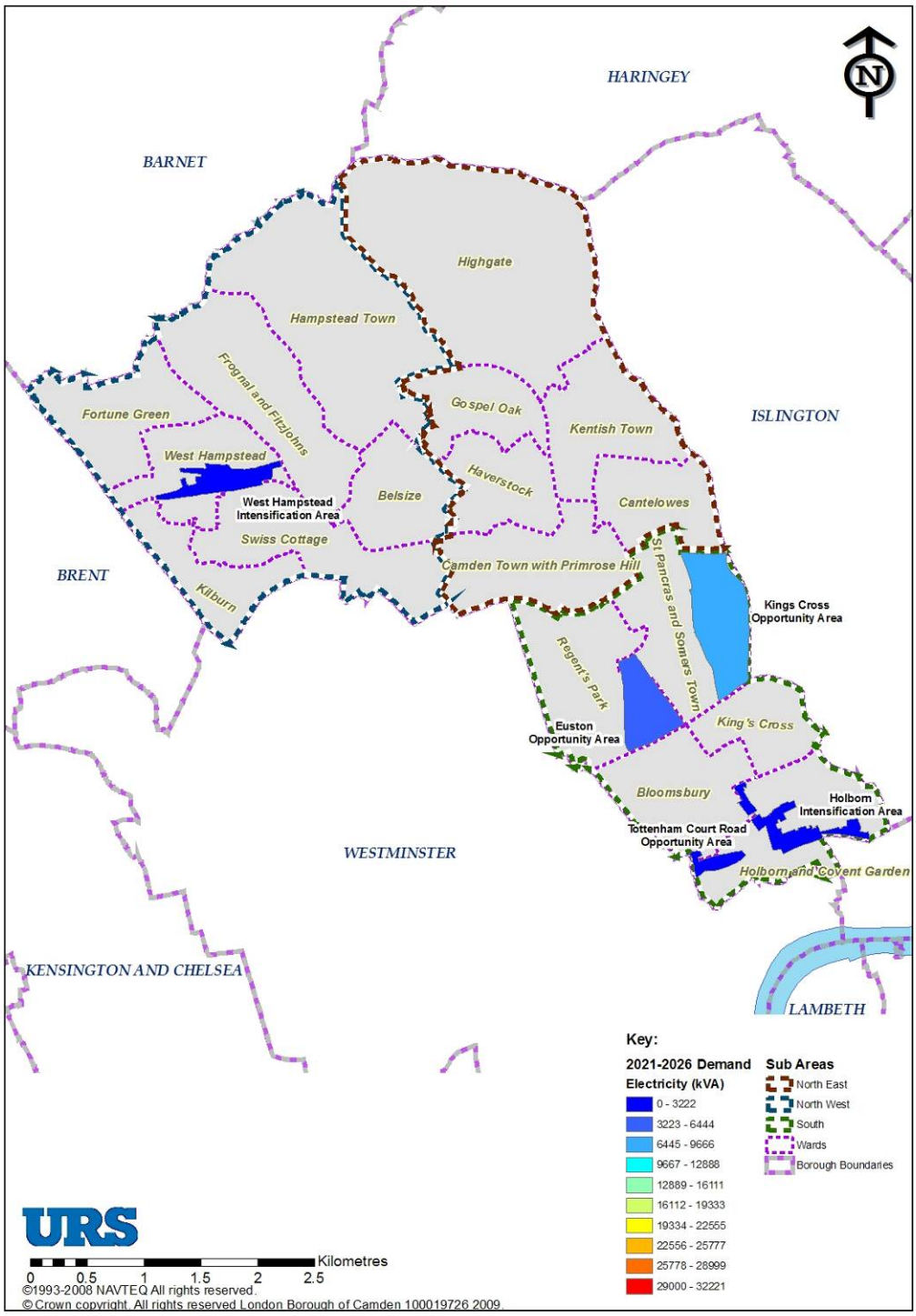
Source: URS based on joint analysis by London Borough of Camden and URS Corporation

Figure 3-14: Projected Electrical Demand Growth Map, by Growth Area, over Time Interval 2016 – 2021, kVA.



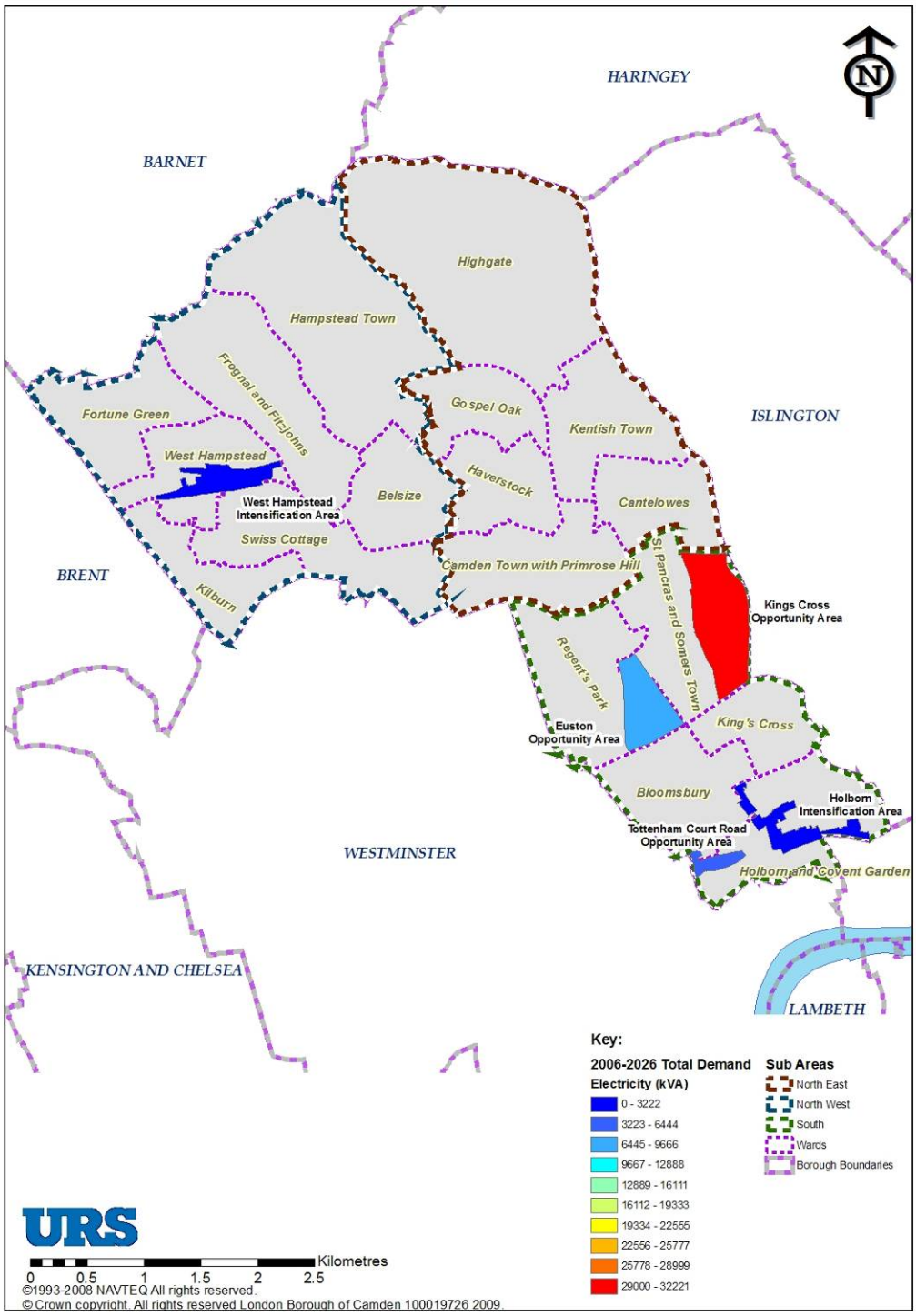
Source: URS based on joint analysis by London Borough of Camden and URS Corporation

Figure 3-15: Projected Electrical Demand Growth Map, by Growth Area, over Time Interval of 2021 – 2026, kVA.



Source: URS based on joint analysis by London Borough of Camden and URS Corporation

Figure 3-16: Projected Electrical Demand Growth Map, by Growth Area, over Time Interval 2006 – 2026, kVA.



Source: URS based on joint analysis by London Borough of Camden and URS Corporation

Forecast Heat Demand

The mapping exercise presenting the findings of **Table 3-3**, illustrated in **Figure 3-17** to **Figure 3-21**, allows an interpretation of the projected increase in the domestic and non-domestic heat (gas) demand for the growth areas.

The Tottenham Court Road and Euston growth areas present a medium heat demand growth over the 2006 – 2026 forecast period.

The Holborn growth area shows the lowest demand growth over the 2006 – 2026 forecast period.

The King's Cross growth area presents a high heat demand growth over the 2006 – 2026 forecast period.

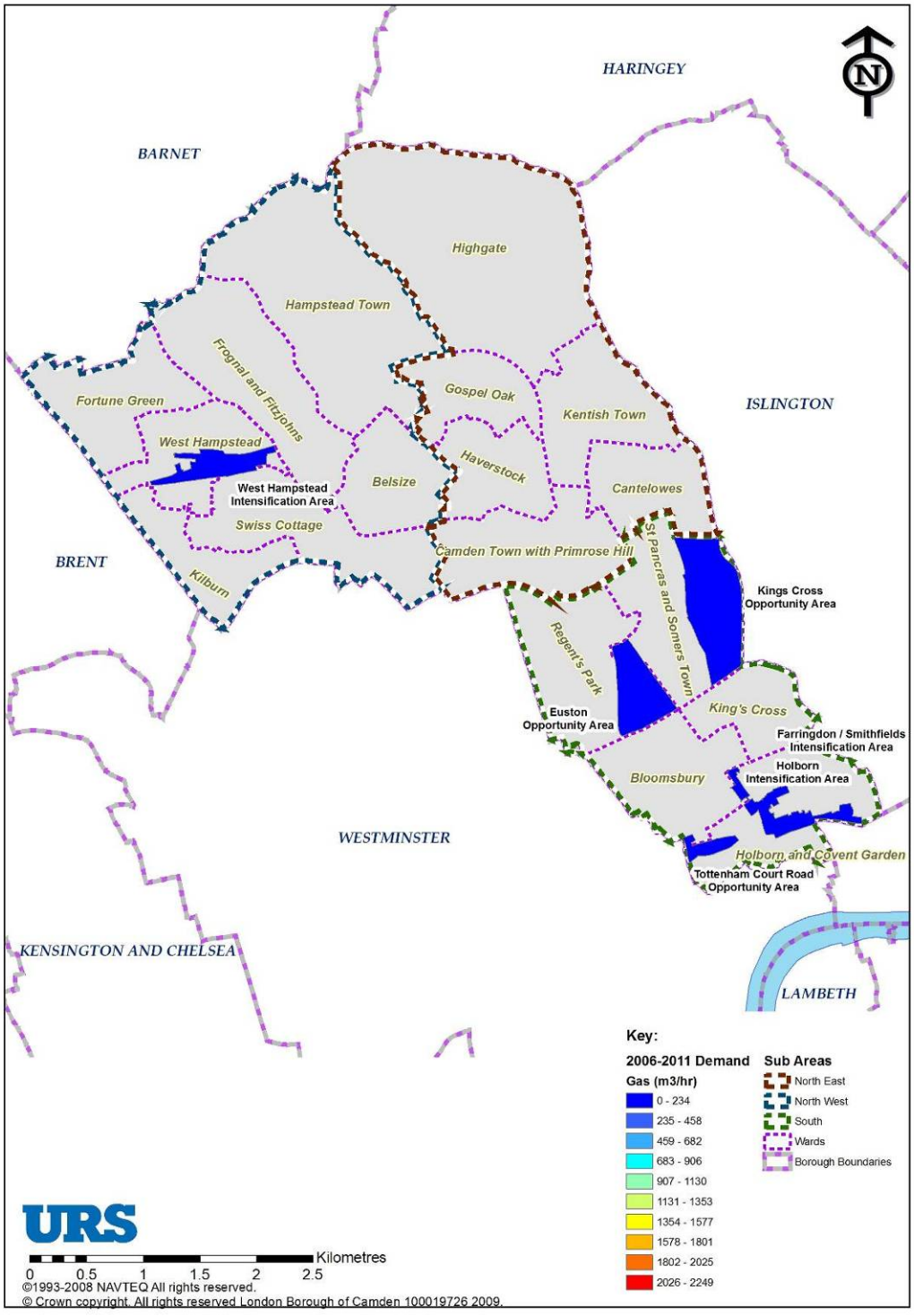
The West Hampstead Interchange growth area shows a low heat demand growth in the 2006-2011 forecast period and a medium heat demand growth in the 2011 – 2026 forecast period.

When considering the total projected growth in the domestic and non-domestic heat demand for the 2006 – 2026 forecast period, the King's Cross growth area demonstrates the greatest growth in heat demand (see **Figure 3-21**). **Table 3-3** illustrates that this growth is predominantly led by the domestic uses within the growth area, specifically over the 2011 – 2016 and 2016 – 2021 forecast periods.

The Euston and West Hampstead Interchange growth areas show a medium growth in heat demand. Again, **Table 3-3** illustrates that this is mostly due to the domestic growth, specifically over the 2011 – 2016, 2016 – 2021 and 2021 – 2026 forecast periods.

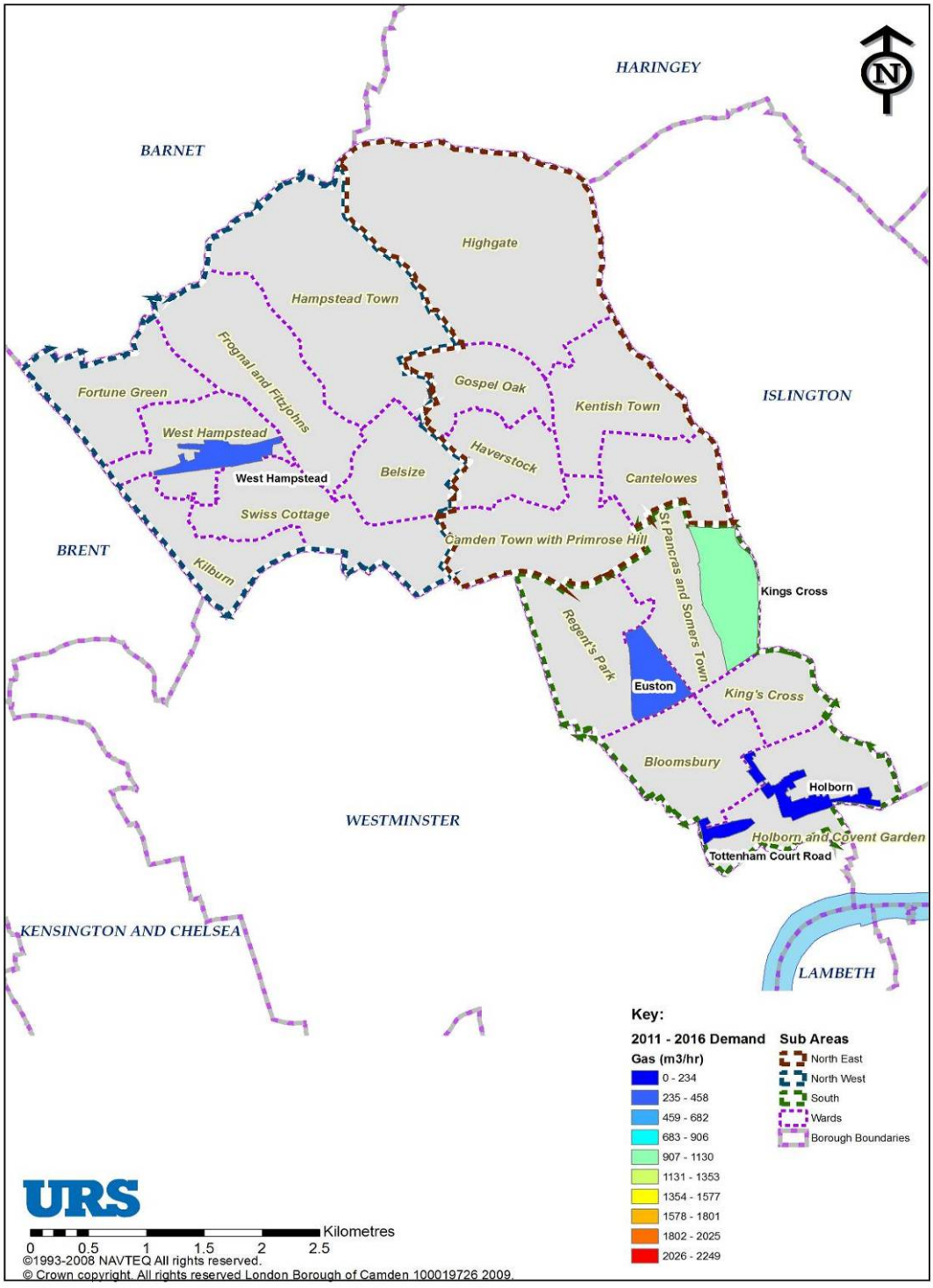
The Tottenham Court and Holborn growth areas demonstrate the lowest growth in heat demand. This is significant, as **Table 3-3** illustrates that this growth is an even contribution from both the domestic, and commercial and industrial uses. This explains the low projected growth as the other growth areas considered are predominantly led by the domestic uses.

Figure 3-17: Projected Heat Demand Growth Map, by Growth Area, over Time Interval of 2006 – 2011–, m3 per hour.



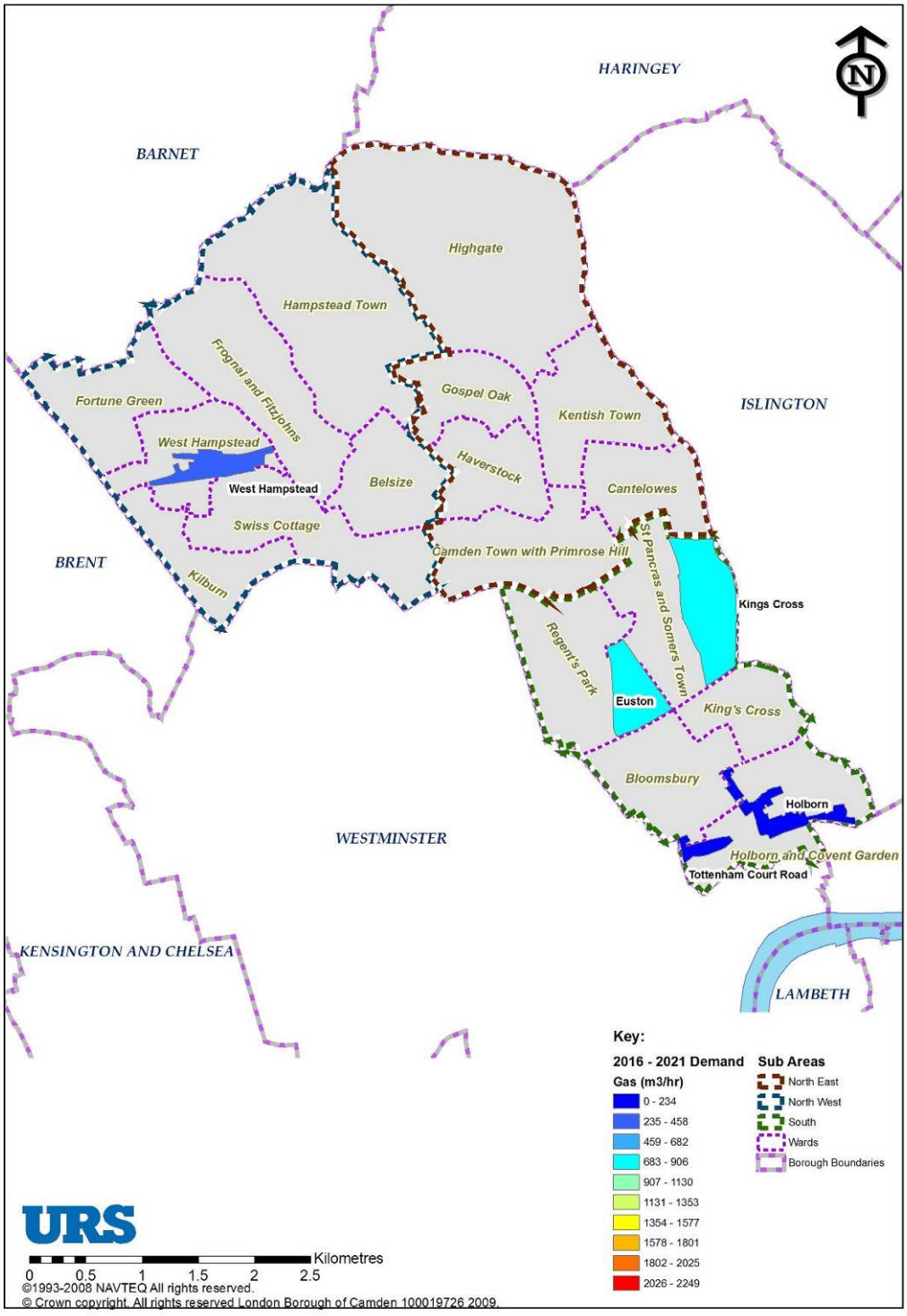
Source: URS based on joint analysis by London Borough of Camden and URS Corporation.

Figure 3-18: Projected Heat Demand Growth Map, by Growth Area, over Time Interval of 2011 – 2016, m3 per hour.



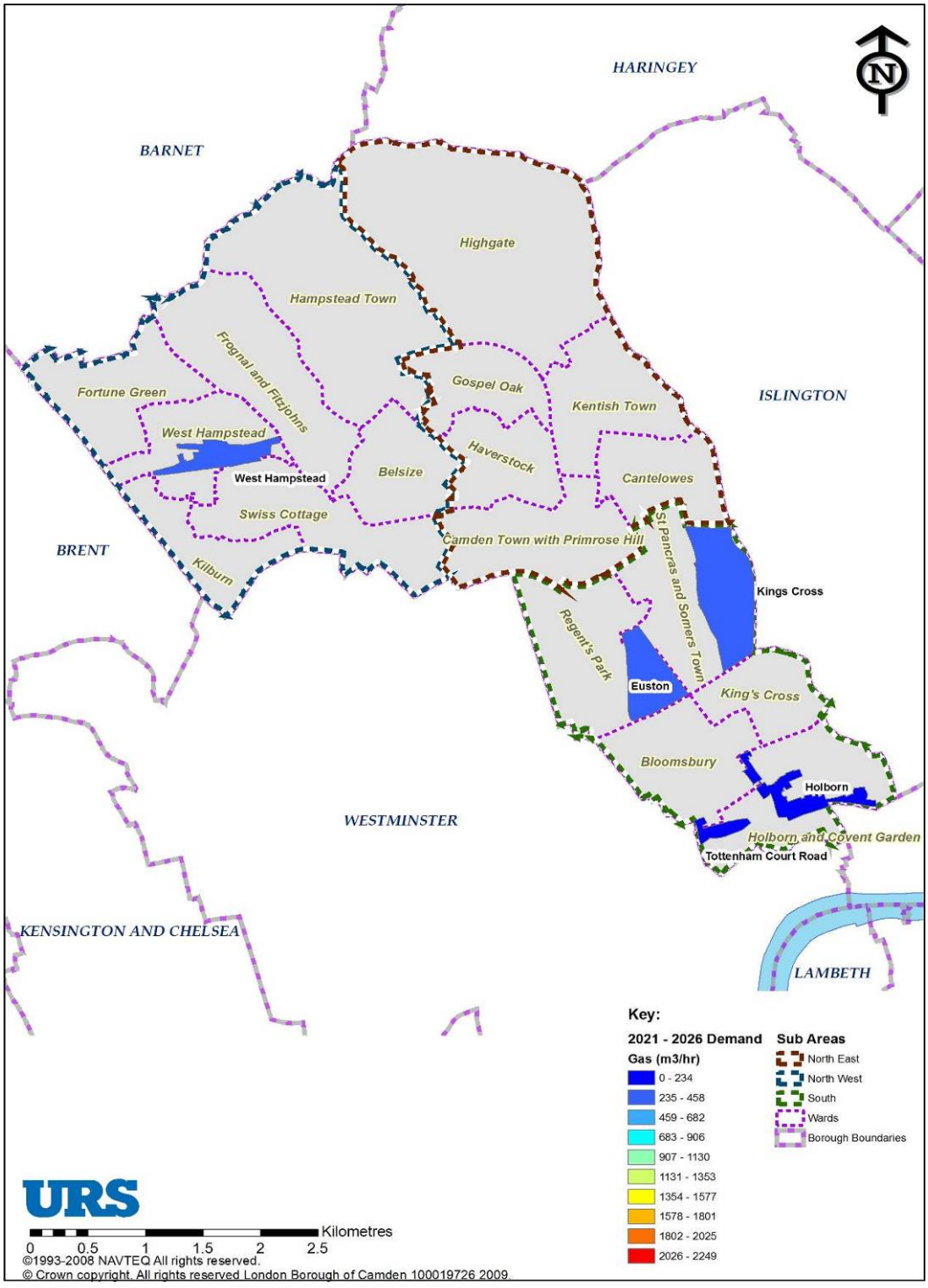
Source: URS based on joint analysis by London Borough of Camden and URS Corporation.

Figure 3-19: Projected Heat Demand Growth Map, by Growth Area, over Time Interval of 2016 – 2021, m3 per hour.



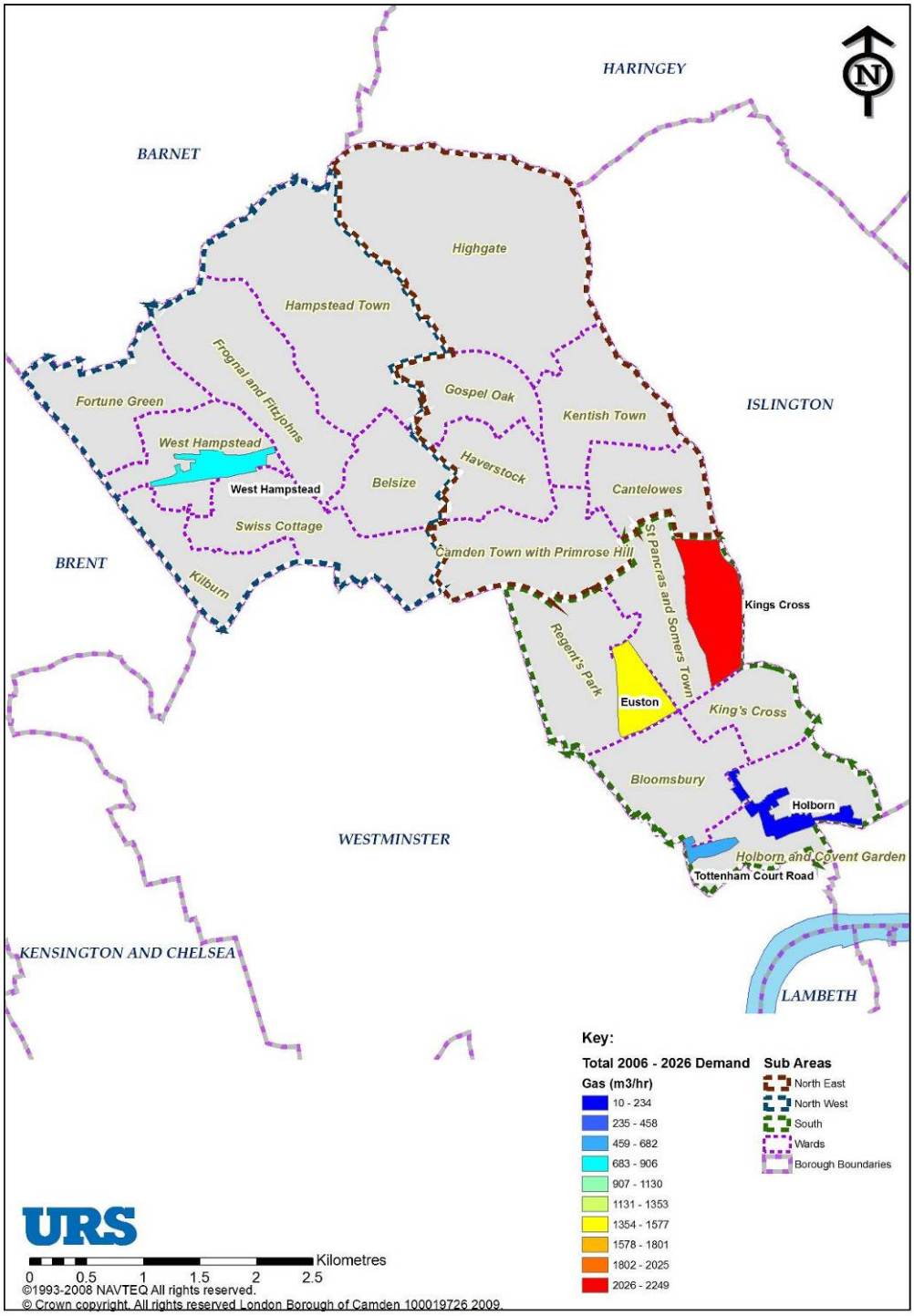
Source: URS based on joint analysis by London Borough of Camden and URS Corporation.

Figure 3-20: Projected Heat Demand Growth Map, by Growth Area, over Time Interval of 2021 – 2026, m3 per hour.



Source: URS based on joint analysis by London Borough of Camden and URS Corporation.

Figure 3-21: Projected Heat Demand Growth Map, by Growth Area, over Time Interval of 2006 – 2026, m3 per hour.



Source: URS based on joint analysis by London Borough of Camden and URS Corporation.

Analysis

Figure 3-17 to **Figure 3-21** illustrate the forecast electrical and heat demands for Camden's growth areas based on **Table 3-2** and **Table 3-3**. An analysis of these maps allows an interpretation of the likely phasing of the decentralised energy systems. Whilst the analysis does not consider the potential CHP capacities for the growth areas when considering both the existing and projected growth in energy demand, a brief discussion of this matter, in relation to driving this component of work forward, is covered in **Section 3.9 Summary and Recommendations**.

King's Cross Growth Area

A significant growth in electrical demand is identified for the forecast period of 2011 – 2016, with a fairly consistent electrical demand growth for the forecast periods of 2016 – 2021 and 2021 – 2026. The electrical demand growth is led by the commercial and industrial uses.

Again, a significant growth in the heat (gas) demand is identified for the forecast period of 2011 – 2016, with a decreasing heat demand growth for the forecast periods of 2016 – 2021 and 2021 – 2026. The heat demand growth is led by the domestic uses.

Euston Growth Area

A significant growth in electrical demand is identified for the forecast period of 2016 – 2021, with a fairly consistent electrical demand growth for the forecast period of 2021 – 2026. The electrical demand growth is led by both the domestic, and commercial and industrial uses.

Again, a significant growth in the heat demand is identified for the forecast period of 2016 – 2021, with a decreasing heat demand growth for the following forecast period of 2021 – 2026. The heat demand growth is led by the domestic uses.

Tottenham Court Road Growth Area

A fairly consistent growth in electrical demand is identified for the forecast periods of 2006 – 2011, 2011 – 2016, and 2016 – 2021, with a decrease in the electrical demand growth for the forecast period of 2021 – 2026. The electrical demand growth is led by the commercial and industrial uses.

Again, a fairly consistent growth in the heat demand is identified for the forecast periods of 2006 – 2011, 2011 – 2016, and 2016 – 2021, with a decreasing heat demand growth for the forecast period of 2021 – 2026. The heat demand growth is led by the domestic uses.

Holborn Growth Area

A fairly consistent growth in electrical demand is identified for the forecast periods of 2006 – 2011, 2011 – 2016, 2016 – 2021, and 2021 – 2026. The electrical demand growth is led by the commercial and industrial uses.

Again, a fairly consistent growth in the heat demand is identified for the forecast periods of 2006 – 2011, 2011 – 2016, 2016 – 2021, and 2021 – 2026. The heat demand growth is led by the commercial and industrial uses.

West Hampstead Interchange Growth Area

The expected growth trajectory would result in an increasing growth in electrical demand between 2016 and 2026. The electrical demand growth is led by the domestic uses, with an increase in the commercial component expected in the 2016-2021 period only.

For heat demand, the projected residential and commercial growth would mean a significant growth in the heat demand is identified for the forecast period of 2011 – 2016, with a fairly consistent heat demand growth for the forecast periods of 2016 – 2021 and 2021 – 2026. The heat demand growth is led by the domestic uses.

Phasing

The projected domestic and non-domestic heat and electrical demand growth is assessed for forecast periods of 2006 – 2011, 2011 – 2016, 2016 – 2021, 2021 – 2026, and 2006 – 2026. Understanding the projected growth profile for each growth area allows an interpretation of the likely phasing of decentralised energy systems to serve these areas.

An adequately large heat and electrical power customer base is crucial to ensuring that CHP systems are feasible. As such the decentralised energy systems should be in place prior to the delivery of new residential and commercial units so that the Council can request that developments be connected to decentralised energy systems at the planning application stage, thereby ensuring that the viability of these systems over the lifetime of the emerging Core Strategy.

Accordingly, an analysis of phasing generally recommends that CHP systems are fully operational during the relatively high demand growth period, and therefore be delivered (i.e. planned for and constructed) prior to the period where a relatively large demand growth is expected. This has therefore been the approach adopted in this strategic infrastructure study.

It should however be noted that under current market conditions and funding arrangements decentralised energy infrastructure/CHP are put in place along with large developments. In addition all the heat loads generally need to be available at the same time to enable the correct sizing of the CHP unit and to ensure the use of CHP is carbon efficient and financially viable. These issues should be considered when implementing the recommended CHP systems.

King's Cross Growth Area

Due to a significant heat and electrical demand growth for the forecast period of **2011 – 2016**, it is recommended that a decentralised energy system is in place for this growth area during this forecast period.

The recommended phasing is in line with the existing s106 arrangements for the King's Cross Central regeneration scheme, currently being developed by Argent, which require the development of a 7MW CHP system located in 1-3 Canal Street[57].

Euston Growth Area

Due to heat and electrical demand growth in **2016 – 2021**, it is recommended that a decentralised energy system is implemented for this growth area during this forecast period. This is particularly important as the heat demand growth decreases in the following forecast period of 2021 – 2026.

Existing CHP schemes already supply to UCL campuses in the area, Bloomsbury Heat ant Power and Gower Street Heat and Power, and there are a large number of communal heating schemes serving local authority housing estates to the north of Euston Road. This analysis therefore reinforces the LDA's recently completed work on a two-stage feasibility study for an area-wide CHP/district heating network for the Euston Road area. Furthermore, the North East Quadrant development at Regents Place has had approval for CHP to provide energy to the site and to investigate the possibility of exporting heat to the rest of that estate and several Council housing buildings if feasible.

Tottenham Court Road Growth Area

Due to a fairly consistent heat and electrical demand growth for the forecast periods of 2006 – 2011, 2011 – 2016, and 2016 – 2021, it is recommended that a decentralised energy system is implemented for this growth area as soon as possible. This is particularly important as the heat and electrical demand growth decreases in the following forecast period of **2021 – 2026**.

Holborn Growth Area

Due to a fairly consistent heat and electrical demand growth for the forecast periods of 2006 – 2011, 2011 – 2016, 2016 – 2021, and 2021 – 2026, it is recommended that a decentralised energy system is implemented for this growth area as soon as possible to take account of as much of the projected domestic and non-domestic growth as possible.

West Hampstead Interchange Growth Area

Demand for heat and electricity can be expected to increase in the growth area over the period from 2011 to 2026. The most significant growth in electrical demand is forecasted for the 2016 to 2021period. Furthermore, up to 2011, the increase in energy demand will be predominantly led by residential development, with a noticeable growth in commercial demand only anticipated to arise from 2016 onwards.

As discussed further in **Section 3.8**, a balanced residential and commercial energy demand offers greater financial viability for decentralised energy systems due to the likely customer base consisting of mixed loads, which have associated operational benefits.

[57] See http://www.argentkingscross.com/energycentre, accessed on 17/07/2009.

Therefore on the basis that development will come forward in line with the anticipated growth trajectory it is recommended that a decentralised energy system be put in place during the **2016 – 2021** forecast period when mixed loads are anticipated.

It is also understood that the Council will encourage the delivery of a smaller network in the northern part of the borough, at Gospel Oak associated with estate regeneration, or at Camden Town associated with a development at Hawley Wharf[58].

Economic Incentives

Economic incentives will be introduced that recognise the potential for carbon dioxide savings from decentralised energy. The *Energy Act*[59] 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 and increasing the capacity of existing decentralised energy schemes. Of more significance to district heating schemes, however, is OFGEM's reconsideration of the Class C supply licence exemption for schemes of up to $1MW_e$ and whether this is increased or a junior licensing regime for embedded generation is put into place.

Additionally, CHP generation is supported by a number of policies, such as the EU Emissions Trading Scheme (ETS), Carbon Reduction Commitment (CRC) scheme, exemption from the Climate Change Levy and the Renewables Obligation[60]. CHP will also benefit from the forthcoming financial support for renewable heat. The intent is to ensure that the range of carbon pricing mechanisms provides sufficient support to CHP.

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. This will also occur in light of the expected reduction in energy cost that may be attributed to customers from the wide distribution of decentralised energy systems. However, the availability and likelihood of obtaining funding remains a key priority going forward. It is anticipated that where Camden and the surrounding boroughs will need to contribute is in creating the opportunities and providing land for decentralised energy schemes.

The current process of decentralised energy is influenced by limitations set by OFGEM. This is predominantly due to OFGEM's core aim to encourage customer choice and competition, which translates into a preference for the separation of the energy generation, distribution and supply functions. This could present some challenges to installing a decentralised energy system that would concentrate the three functions into the hands of one operator. Also, the electricity distribution system in London, as

[58] London Borough of Camden, Culture and Environment Directorate, 16/07/2009.

[59] Energy Act 2008.

[60] DECC/CLG (2009), *Heat and Energy Saving Strategy*

elsewhere in the UK, has not historically been designed to accommodate connection from local electrical power generation.

This situation is likely to deteriorate as the increasing demand on the electricity network leads 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 are effectively standalone without any interconnection with the wider public network. To achieve this, OFGEM may therefore need to consider rule changes, specifically as they relate to competition rules.

Mixed Loads and Energy Supply Competition

Decentralised energy is only effective in saving carbon dioxide emissions when it is located where heating and power can be supplied most efficiently, i.e. where there are supporting mixed loads associated with anchor heat demand customers (e.g. housing estates, leisure centres, hospitals, schools, universities, etc.). It is essential that the public sector continue to connect these mixed loads to kick start decentralised energy schemes and ensure their economic viability.

With the uncertainty of how the national grid will respond to multiple local connection points associated with the export of electrical power to the grid, and ensuring effective competition for heat supply, sustainable energy infrastructure networks are essential to ensuring customers can benefit from competition[61].

Industry Standards and Regulation

There is a requirement to not only establish London wide standards and technical specifications for heat networks, but to also establish national heat network standards. Whilst we are only considering the Camden 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's longer term/policy/regulatory change.

The definition of zero carbon to recognise near site provision is becoming an extremely prevalent topic and the Department of Central and Local Government (CLG) is currently

[61] There are complexities that arise with regards to whether or not EDF will permit the connection for exporting electricity, which are affected by OFGEM regulation. In this respect competition may be helpful.

undertaking a public consultation[62] 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 carbon dioxide emissions remaining after high levels of energy efficiency and passive design measures are applied and an on site renewable energy supply is provided.

3.8. Funding

Both National Grid and EDF are responsible for providing strategic capacity and the five yearly regulatory reviews[63] take into account projected growth, system performance improvements, safety improvements and maintenance. It is this vehicle that determines part of the price for energy that each consumer in the UK pays and as a result the main financial resource available to the utilities providers to fund works to their networks. .

The current rules established by OFGEM however encourage reactive management to a certain degree. This is because the works required to provide connections for new developments and the associated increased energy requirements and diversions can broadly be charged to third parties, e.g. developers.

Accordingly, the providers themselves will fund works that are planned for by providers in advance of the actual need. On the other hand, if the works are needed as a result of a specific development, then the respective utility company can charge private developers. This system, particularly for local infrastructure, therefore provides an opportunity to undertake works only when they become strictly necessary.

Most developments will have a charge made for developing the utility network, particularly electricity. The general argument is that the existing system is capable of working without load increase and therefore the changes required to accommodate growth must be paid for by the development. In the event that the utility company gains benefit from the network extension or upgrade, there are rules which effectively apportion cost.

In defence of the utility industry, developments do not always proceed and given that energy requirements are based upon individual client specifications, it is difficult to design and install apparatus in advance. Likewise, from a business point of view, having a third party pay for assets is an attractive proposition as it means that all capital expenditure is focussed upon managing assets and providing for natural growth. Current rules employed by OFGEM support this position. The negative element to this is that infrastructure is then only planned against individual requirements, and normally reactively.

---

[62] CLG (2008), *Definition of Zero Carbon Homes and Non-Domestic Buildings, Consultation*

[63] Every five years the utility industry submits proposals to their respective regulators to establish capital expenditure programmes and revenue generating formulas.

Options for consideration are to lobby OFGEM for a change in process whereby the development parcel is allocated a load profile and EDF or National Grid is charged with establishing capacity to a given point in advance. The incoming developer would then be tasked with designing a building to that profile and this inherently encourages developing technologies or stimulating engineering excellence.

Alternatively, Camden, as an asset provider, could install utility apparatus based upon the above and recover costs plus administration from each developer – effectively a roof tax but based upon a true business model. In most cases, the political winds will determine how this is to be tackled ongoing; as the system operates currently there is little encouragement to develop utility networks in advance of development.

Funding Sustainable Energy Generation: Partnerships for Funding and Delivery

Bodies such as the LDA's DED Unit are in a position to take advantage of possible Government funding, and to establish 'inter' and 'cross' boundary PPP's 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 sustainable energy infrastructure.

PFI's and PPP's are typically the funding vehicle required to achieve financial viability of projects, and a number have already been established by ESCos. 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's and PPP's. Banks and energy companies will need to further work together on innovative ways of securing funding for low carbon decentralised energy projects.

3.9. Summary and Recommendations

Summary of Infrastructure Requirements Assessment

As for water and sewerage infrastructure, it has not been possible to conclude specific infrastructure requirements arising from the projected residential and commercial growth in Camden.

The scale of energy demand in Camden up to 2026 may equate to the need for 3 primary substations, an upgrade to or establishing of one grid site (converting electricity typically from 132kV to 33kV) and up to 77 one-MVA (i.e. secondary substation catering for local demand). However, this is only indicative of scale of the likely physical requirements as the position is unclear other than the anticipated out turn report from EDF is that there is a shortfall in provision. The magnitude, the limitations and the locations are not yet identified. Discussions with EDF remain ongoing.

For gas, the 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 scale of projected demand

would potentially translate in the need of two or three pressure reducing stations (transforming the gas from medium pressure to low pressure). However, this does not account for Camden's specific spare capacity or shortages in current provision.

Recommendations

Recommendations for Energy Infrastructure

In light of the above, it is suggested that Camden should engage with EDF and National Grid. The utility providers need to assess the impact of all growth against the baseline values they are currently operating to as this will then identify potential shortfalls. The report, whilst wishing to identify this, has yet to fully establish out turn positions although it does recognise that the gas network is reported as being capable of accepting current forecasts of increased consumption.

Engagement with National Grid and EDF should be on an ongoing basis to clarify their ability to furnish energy supplies to growth plans and to include timeframes, cost implications and delivery risks / opportunities.

Recommendations for Sustainable Energy Infrastructure

An analysis of the forecast demand in domestic and non-domestic gas and electricity consumption, for the growth areas identified, has been undertaken. The analysis demonstrated forecast demand for five year intervals from 2006 to 2026. The recommended phasing/ delivery of decentralised energy for the identified growth areas is:

- King's Cross: 2011 – 2016; At King's Cross a 7MW CHP system is already in the pipeline as part of the King's Cross Central development.
- Euston and West Hampstead Interchange: 2016 – 2021: the LDA has already completed the first of a two-stage feasibility study for an area-wide CHP/district heating network for the Euston Road area. Also, CHP schemes already supply to UCL campuses in the area, Bloomsbury Heat ant Power and Gower Street Heat and Power, and there are a large number of communal heating schemes serving local authority housing estates to the north of Euston Road. It is also understood that the Council will encourage the delivery of a smaller network in the north of the borough, at Gospel Oak associated with estate regeneration or at Camden Town associated with a development at Hawley Wharf.
- Tottenham Court Road and Holborn: As soon as possible.

Understanding the recommended phasing implications is essential to delivering viable decentralised energy systems. It is recommended that issues such as: safeguarding possible heat distribution network routes within the growth areas, growth area interconnection through a borough wide heat distribution network, identifying the customer base, establishing expectations for the customer base to connect to heat distribution networks, etc. should be considered alongside the recommended phasing.

Given the ageing electricity network, the requirement for EDF is not only to develop capacity but also undertake significant asset replacement due to the increasing tendency of the network to fail and the efficiency, and inherent safety, deteriorating as the network approaches a 40 year lifecycle. Thus there is likely to be a requirement for asset replacement in the short term.

In order to allow connection of decentralised energy systems to the national grid, considerable local reinforcement is required. This offers an opportunity/incentive for EDF to begin planning for these works as it allows EDF to fund aspects of the required asset replacement through external partners, e.g. ESCos, the GLA/LDA, etc. Additionally, with the introduction of electricity generation capacity at a borough/local level allows the alleviation of the increase in capacity requirements due to the forecast growth.

Going forward there is the potential for further work to establish the capacities of the decentralised energy systems proposed for the growth areas, based on the associated existing and forecast energy demands. A separate study addressing this question would allow the Council to assess whether the borough is likely to align with both regional and national policies relating to climate change.

4. TELECOMMUNICATIONS

4.1. Introduction and Overview

Scope

Telecommunications for Camden is afforded via a system of ducts and chambers, owned and operated by various companies although BT (British Telecommunications) is considered to be the largest.

The ducts and chambers are laid under the streets of Camden; extending the network does not inherently mean that the works to upgrade or replace existing system capability will be intrusive given that old cabling can be recovered, thus providing spare 'space'.

The study will not afford a projected telecommunications demand as the infrastructure is likely to be broadly in place and is far less predictable than other utility networks. In the event that cabling needs to be replaced, there is a complex duct system in place that broadly means that redundant cables can be removed and new ones inserted without the need for intrusive works.

Management Arrangements and Responsibilities

Within the modern telecommunications market, there are numerous companies now affording services to a wide client base; this extends from Virgin Media through to COLT (City of London Telecom) that provide services to specific target audiences.

Historically, British Telecommunications (BT), in a former life as the GPO (General Post Office), is considered to be the incumbent provider albeit this is purely down to volume of assets owned and operated, as opposed to services.

The telecommunications industry is perceived to be far more dynamic in terms of change when compared to other utility industries. The influx of technology has lead to significant changes in user requirements and this has been managed by the introduction of new cables; for example fibre optic.

This facet of the utility marketplace is very much client lead and therefore demands are wholly different to that of water or energy given that the latter two are a necessity to live, whilst telecommunications are more lifestyle necessity.

The basis of the report is therefore to consider what delivery constraints may be identified given that the strategic infrastructure is likely to demand less space under current technology than, for instance, forty years ago.

Telecommunications in Camden

The following companies are believed to have elements of telecommunications in Camden:

- British Telecommunications
- COLT Telecom (City of London Telecommunications)
- 51 Degrees Limited
- Abovenet Communications
- Cable and Wireless
- Comsol Communication
- Easynet Communications
- Fibernet
- Fibrespan
- Global Crossing
- Hub Network
- Hutchison Network
- Infolines Public Networks
- Level 3 Communications
- Thus Group
- Urband
- Virgin Media
- Worldcom
- Your Communications
- NWP Spectrum.

4.2. Existing and Committed Infrastructure

Existing Provision

New entrants to the marketplace have installed their own telecommunication equipment relatively recently, and as a result BT is the provider whose assets suffer the most from ageing and need of replacement. Older parts of Camden, particularly in residential areas, are likely to be provided with telecommunications using old cables whilst business areas, or indeed re-development areas, are likely to be serviced with more modern facilities.

BT has planned works in Camden[64] but there is no distinction in terms of how intrusive the works themselves may be. This is due to the fact that telecommunications networks are all based upon chambers/ boxes and ducts that pass between these chambers/ boxes. If a cable needs to be replaced, intrusive works may not be necessarily required.

[64] British Telecom, Senior Regulatory Specialist, 17/12/08.

As a result, it is difficult to anticipate whether BT planned works will cause minor disruption to local stakeholder rather than, for instance, requiring major highway excavations.

Planned Investment

Investment will be formed by civil works (excavations in highway for example) and/ or cabling. Neither facet has been identified, as is it a market that changes in terms of technology and therefore customer provision.

In both circumstances, the situation is very dynamic and will pre-dominantly be customer driven; it is possible that for a new development, for example, that civils works are undertaken but cabling is then not installed as the end user may opt to use mobile technology.

Adequacy of Existing and Committed Infrastructure

BT have identified that they currently undertake circa 895 projects on the network in Camden each year; for 2026, this figure is to rise to 976 per annum. The system, as previously identified, contains a mixture of copper and fibre cables that will need replacing due to high failure rates, insufficient capacity or damage by third parties. The works may involve intrusive techniques (i.e. excavations in highway) or simple chamber access only whereby old redundant cables are removed and new ones inserted.

Telecommunications are wholly different to that of the other networks as equipment generally has reduced in size so that existing telephone exchanges can easily accommodate growth without new ones being required. Likewise with cabling; new fibre optic cables are able to carry a greater volume, and to a higher grade, of data than that of historical counterparts.

4.3. Estimating Future Demand

BT, or the appointed telecommunications provider, will install new boxes and ducts throughout the development; once this ‘civils’ element is concluded, cabling will be inserted and connection made to each point of use.

The number of lines required will determine the volume of duct installed; whilst it is feasible to predict that each residential unit will require one landline, this is not a given noting the availability of mobile phone technology and internet connection via the same. To this end, the predictability is that duct tracks will be required to serve each development parcel but the number of lines is not easily estimated.

Issues/ Future Trends

Government aspirations are that each dwelling has access to high quality telecommunications such as broadband. On the assumption that the bulk of this will be via landlines, this is likely to incur a greater number of asset replacement programmes, mostly by BT, and some can be expected to be ‘ground intrusive’.

As noted earlier however, mobile phone technology and mobile internet connectivity via 'dongles' is increasingly available and predictability on the use of landlines becomes less so.

4.4. Infrastructure Provision Needs arising from Growth

The provision of telecommunications is likely to impact upon the borough albeit the actual location and the magnitude of the works remain unknown. The impact may be nominal via the replacement of existing cabling in existing duct tracks or it may require significant excavations in highway. In reality, there is likely to be a mix of both but this will only be determined at the time of development.

Of course, alternative suppliers exist so an independent provider, such as Virgin Media, may well bundle telecommunications, broadband, television and other data requirements into a single service. The provision of infrastructure by, say, BT may then be wholly negated and the environmental impact will have served no purpose whatsoever.

Infrastructure Requirements

On the assumption that each development will install the ability to connect to a telecommunications network, each property will have a service duct connected to a main duct track located in highway. This main will then extend back to an existing duct track located close to the entrance to the site.

As and when a customer requires a connection, cabling will then be installed unless the specification of the building requires this to occur by default. Most high density housing follows this protocol but it is not a given.

The assumptions made are that each residential dwelling would then require a single landline capable of broadband and voice transmission.

Phasing

Infrastructure will generally only be installed once end users demand a service. All providers will be updating capability (for example, consider the speed changes in broadband even over the last 2 years) ongoing and works required will only be determined once application is made for connection.

4.5. Funding

The telecommunications process is wholly reactive and funding is established via the provider and, more recently, the developer. As with the other utility networks, infrastructure will only be installed once a definitive design has been concluded and this will be based upon trends at the time.

Normal protocols are that the construction team will make application to the provider of their choice and costs, designs, impacts on the environment and local stakeholders will become clearer at that time.

4.6. Summary

Summary of Infrastructure Requirements Assessment

Telecommunications is a fast moving market and therefore predicting growth impacts, customer choice and likely works to achieve delivery is difficult normal, particularly when compared to water and energy, the choices and needs are wholly different. The telecommunication networks are ever changing and there is unlikely to be a gap in provision.

Recommendations

In light of the impossibility to identify conclusively the infrastructure requirements that are likely to be associated to increasing demand for telecommunication services in Camden up to 2026, it is recommended that Camden Council maintains dialogue with telecommunication providers so as to co-ordinate the use of highway space and the ability to pre-install, if at all possible, duct runs that mitigate the need to re-excavate highway.

PART B – FOUL AND SURFACE WATER DRAINAGE

5. SEWERAGE

5.1. Introduction and Overview

Scope

The elements of infrastructure covered in this section include physical assets associated with conveying and treating surface and foul water from the Camden area and discharging the treated effluent to watercourses (mainly the River Thames). Sewerage infrastructure can be identified as follows: sewage treatment works; pumping stations; sewers; maintenance and control equipment; IT and buildings; and the proposed Thames Tideway Tunnel[65]. Private drainage networks within individual sites (i.e. non-adopted drainage) have been omitted because sewer records are generally not available from private owners.

Camden's Sewer System

The sewers in Camden are part of a combined sewer system. The sewer network within Camden is part of the larger sewer network serving the rest of London. The capacity of Camden's network affects downstream parts of the network in neighbouring boroughs such as the City of London. A combined sewer can be defined as a partially separated system for foul or sanitary drainage and surface water or storm-water run-off. The purpose of a sewer system is to remove all waste water, including rainwater from roofs and paved or impermeable surfaces, and convey it to treatment works.

A combined sewer has the advantage of providing a single network of pipes and is therefore cheaper to build. Historically most urban sewers were built as combined systems in the 19th and 20th centuries. During dry weather, all water entering the system is treated at a sewer treatment works (e.g. Beckton), including rainwater, then the clean effluent is discharged to the river. However, during wet weather the volume of water entering the system is much higher because of the additional rainfall. The sewer may 'surcharge', which is when the flow is too high for the pipes to carry, resulting in sewage 'backing up' within the system causing sewer flooding. To relieve surcharging, the sewage is allowed to overflow into rivers via 'combined sewer outfalls' or CSOs.

The disadvantage of a combined sewer system is that rivers and surrounding ecosystems can become polluted by CSO discharges containing untreated human and industrial waste, toxic materials and debris during high rainfall events. EU regulations have been introduced to protect water quality and biodiversity, such as the Urban Waste Water Treatment Directive introduced in 1995 to protect the environment from the adverse

[65] The Thames Tideway Tunnel is a major investment project in London's sewage infrastructure that is currently undergoing planning. Further detail is provided in **Section 5.2** below.

effects of sewage discharges, and the Water Framework Directive introduced in 2000 with the aim of reaching good chemical and ecological status in inland and coastal waters by 2015.

History of London's Sewers from Victorian times

London's sewers were originally designed in the 19th century. In 1805, flushing toilets were not in widespread use since there was no supply of running water to flush it, and sanitation relied on the cesspit. At this time there were 150,000 cesspits serving a population of one million.

During the Industrial Revolution, there was a dramatic increase in London's population and by the mid 19th century the population had reached 2 million. As the population rose, the overflowing cesspits were increasingly connected to surface water drains that discharged straight into the Thames, which was also the main source of drinking water.

By 1848, pollution of the River Thames led to the establishment of the Metropolitan Commission of Sewers (later the Metropolitan Board of Works). Cholera outbreaks in 1832 and 1849, together with the 'Great Stink' of 1858 when Parliament was suspended due to the stench of sewage from the Thames, led to construction in 1859 of the London sewerage system led by Joseph Bazalgette.

Mains Installation in Euston Road, 1920s

By 1874 the system was fully operational. Interceptor sewers were constructed to convey sewage to treatment works, with the raw sewage only entering the river during periods of heavy rainfall via newly constructed 'Combined Sewage Outfalls' (CSOs). Other measures were implemented to improve drinking water supply.

The system has since expanded to an extent in line with economic and population growth and increasing rainfall intensities. Much of the system dates from Bazalgette's original construction and operates close to capacity. The system still relies on CSOs to relieve surcharging in times of heavy rainfall.

Sources: *http://www.thameswater.co.uk/cps/rde/xchg/corp/hs.xsl/850.htm*
http://www.thameswater.co.uk/cps/rde/xbcr/corp/gallery-mains-installation-euston-road-london.jpg

Policy Drivers

At national and EU level, major policy drivers will be the Urban Waste Water Treatment Directive and the Water Framework Directive improving water quality standards. The UK *Water and Flood Management Bill*, published in draft form in April 2009, is designed to improve flood risk management in response to the summer 2007 floods. Under the

proposed Bill, LBC would gain new roles and responsibilities including local flood risk mapping and identifying ownership to resolve flooding problems as they arise, and would have new responsibilities for drainage. Developers' automatic right to connect to the sewer system under the *Water Industry Act* 1991 would be removed and connection would become conditional on meeting new standards including SUDS (Sustainable Drainage System) implementation.

In accordance with Camden's Preferred Development Policy DP12 on water use and management, Camden should ensure that in accommodating the expected residential and commercial growth development does not cause harm to the water environment, water quality and drainage systems and prevents or mitigate local surface water and down-stream flooding[66]. The Core Strategy Preferred Approach also identifies that Camden faces specific environmental issues including surface water and sewer flooding. Sewerage infrastructure provision is an essential part of Camden's flood defence strategy[67].

The key policy drivers behind sewerage infrastructure provision include providing for sanitation, prevention of sewer flooding, especially for residential basement properties; environmental improvements such as raising effluent quality standards from treatment works to protect rivers; providing new infrastructure to meet the demands of population growth and new office, retail and leisure development; and dealing with increased rainfall intensities due to climate change.

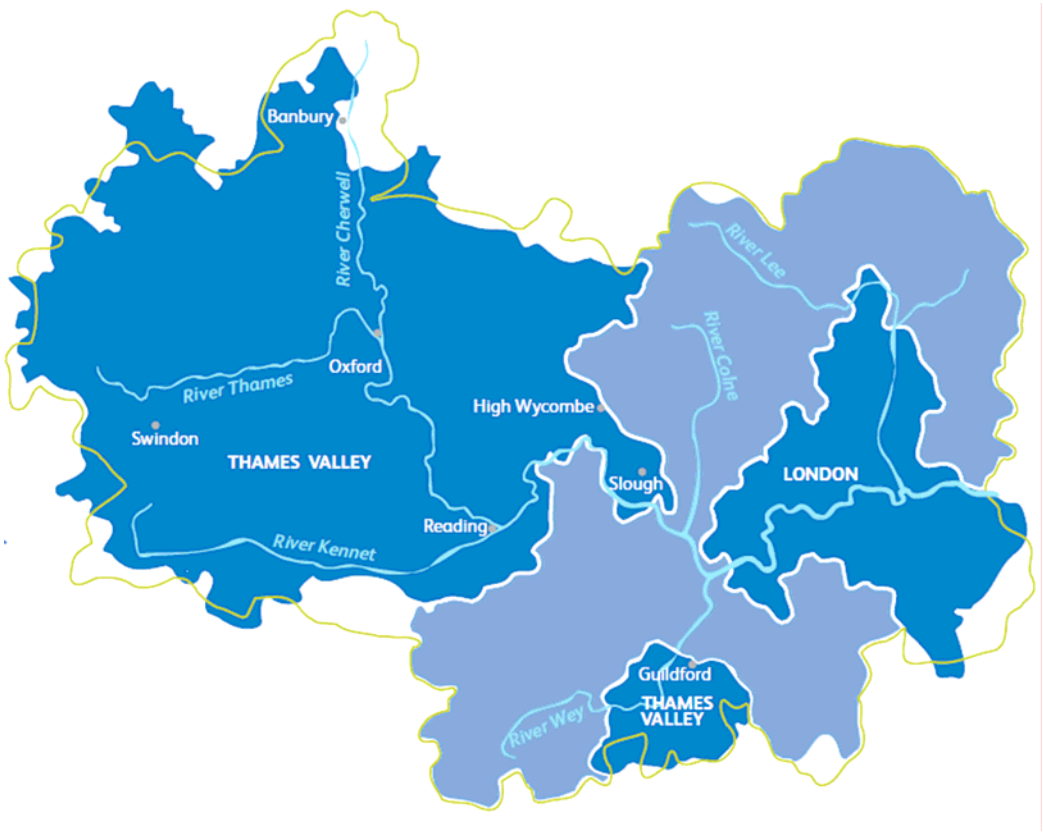
Management Arrangements and Responsibilities

Sewerage infrastructure in Camden is a combined surface and foul water system owned and operated by Thames Water. The Thames Water region includes not only Camden but also most of the Thames catchment area, from Warwickshire to Sussex and from Gloucestershire to Essex.

[66] London Borough of Camden (2008), *Shaping Camden, Camden's Local Development Strategy, Preferred Development Policies*, p. 28.

[67] Ibid.

Figure 5-1: Thames Water Region



Source: Thames Water (2008), Five-Year Plan from 2010 to 2015, Draft Report, p.6.

5.2. Existing and Committed Infrastructure Provision

Existing Provision

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[68]. The treatment plant serving Camden is Beckton sewer treatment works. Existing assets require routine maintenance including sewage treatment works, pumping stations, sludge treatment, sewers and ancillary equipment including maintenance and control equipment, IT and buildings.

Table 5-1 shows an estimate of total sewage produced in Camden based on data provided by Thames Water[69]. As a comparison, the baseline volumes of sewage were

[68] It was not possible to obtain data from Thames Water specific to Camden. Contact was made withThames Water, Property Services, November and December 2008.

[69] Thames Water treats 4.3M cubic metres per day for 13.5M customers in their region. This means that Thames Water receives approximately 319 L/day per customer at their sewer treatment works. The baseline population of Camden is 231,900 (ONS, 2007). Using the rate of 319 L/day this means that Camden produces 73.9M L/day of

calculated according to the standard industry procedure used to design adoptable sewers[70]. The assessment does not consider surface water drainage.

Table 5-1: Baseline Sewage Flow Rates for Residential and Commercial Uses

Type of Development	***Volume of Sewage (L/day)***
Residential	46.4M
Commercial (Office, Retail)	26.8M
Leisure	N/a
Total (Thames Water figures in brackets)	**73.2M (73.9M)**

Source: Residential, commercial and office baseline figures obtained from ONS, 2007; Foul flow rates calculated according to Sewers for Adoption 6th edition; Thames Water data obtained from http://www.thameswater.co.uk/cps/rde/xchg/corp/hs.xsl/4625.htm About Us, Our Business, Facts and Figures, accessed on 13 February 2009.

Planned Investment

Thames Water Five Year Plan

Thames Water own and fund improvements to the sewerage infrastructure in Camden and are solely responsible for providing sewerage infrastructure in Camden. New infrastructure is planned and funded in five-year cycles known as Asset Management Plans (AMPs)[71].

Across their entire area, current Thames Water maintenance expenditure is on average £1bn per year. Thames Water plan to invest a total of £6.5bn between 2010 and 2015 in

sewage. It should be noted that in the context of Thames Water data customers do include government and commercial organisations that may use particularly large quantities of water. Therefore the 319 L/day figure is not a per capita water figure to be applied to the expected additional population in Camden. In our assessment of Thames Water's figures we have used the residential population as an approximation of the number of Thames Water customers.

[70] The figures are illustrated in detail in **Section 5.3**: 200 L/day per person for residential development and 1.1 L/s per 10,000 Sqm for commercial areas including offices, and retail and leisure uses. Water Research Council (2006), *Sewers for Adoption, 6th Edition*.

[71] The cost of planned maintenance and improvements to sewerage infrastructure up to 2026 was estimated based on a review of the Thames Water 5-year and 25-year investment plans. Beyond 2015 Thames Water have not yet made detailed investment plans other than the long term investment plans outlined here.

Source: Thames Water (2008), *Five-Year Plan from 2010 to 2015, Draft Report*; Thames Water (2007), *Taking Care of Water – The Next 25 Years (2010-2035)*.

both water supply and sewer services, and a total of £27bn over the next 25 years. Sewerage investment in 2010 to 2015 in the AMP 4 period will total £4.2bn[72].

In their Draft Five Year Plan 2010 to 2015 (AMP 5) Thames Water identifies possible measures to meet future expansion in levels of service provision through new infrastructure and improved existing infrastructure. At this stage, no detailed options have been made available. Possible measures to expand service provision are as follows:

- Upgrades to treatment works including sludge capacity
- Improving quality of treated effluent; monitoring
- Emergency measures; flooding; reduce CO_2 emissions
- Thames Tideway Tunnel; improvements to Beckton treatment works
- New infrastructure to accommodate population growth
- Sewer flooding alleviation
- Odour reduction from treatment works.

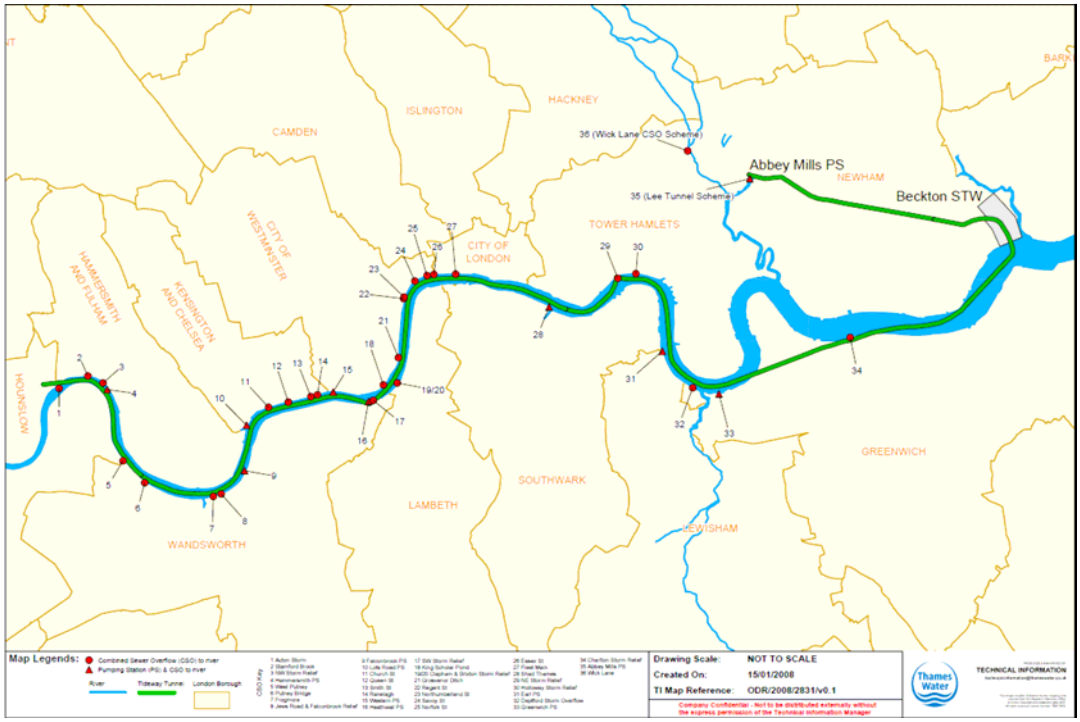
Thames Tideway Tunnel

To address requirements for quality improvements, the proposed Thames Tideway Tunnel will capture and transport raw sewage that would otherwise discharge into the River Thames. Whilst the project is mainly driven by EU ecology legislation, it will also help to alleviate some of the flood risk due to sewers and surface water.

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 Combined Sewage Outfalls (CSOs). The Thames Tunnel is the larger of the two projects 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 and the situation is predicted to get worse due to expected population growth and more intense rain storms as the climate changes. Continuing urbanisation through paving over landscaped areas preventing rainfall from being soaked up by the ground is adding to the problem. The project will be entirely funded by Thames Water through revenue and has been allocated accordingly as shown in **Table 5-2**. As such Camden will be involved in the project when it reaches planning stage but it is not known at this stage whether Camden will make any direct financial contribution.

[72] Thames Water (2007), *Taking Care of Water – The Next 25 Years (2010-2035)*

Figure 5-2: Proposed Tideway Tunnel Route and Connected Combined Sewer Overflow



Source: Thames Water

Other Project Priorities

Following consultations between Thames Water and their customers, the highest priority in terms of the company's investment will be to reduce sewer flooding within properties and to deal with odour nuisance caused by treatment works. While protecting the aquatic environment within watercourses is considered to be a priority, it should be noted that the proposed Thames Tideway Tunnel Project noted above has still not yet received planning permission and therefore may not be implemented in its planned form.

Pro-rata Planned Investment Programme Costs for Camden

Table 5-2 shows planned capital investment in sewerage infrastructure within Camden, 2010-2015. The figures are for the whole Thames Water region. Thames Water was unable to provide figures for Camden since much of their investment is directed towards large-scale assets that serve areas greater than the study area. However, in order to overcome this, URS have calculated some approximate figures for Camden shown which were estimated based on equivalent population where relevant[73].

[73] In terms of population Camden is slightly more significant; around 0.232m people live in Camden compared to a total population of 13.5m in the Thames Region (1.7% by population).

Table 5-2: Capital Investment in Sewers Infrastructure in Camden, 2006 – 2025

	Estimated Camden Cost (Thames Water Region Cost in Brackets)[74]			
Key Activity Projections	***2007-2010***	***2010-2015***	***2015-2020***	***2020-2025***
New and renovated sewers	N/A	£39m (£2,297m)	£35m (£2,079m)	N/A
New and refurbished treatment works	N/A	£30m (£1,755m)	£29m (£1,682m)	N/A
New and refurbished pumping stations	N/A	£2m (£125m)	£2m (£118m)	N/A
Management and general costs	N/A	£3m (£191m)	£3m (£199m)	N/A
Thames Tideway Project (also includes the Lee tunnel)		£22m[75] (£1,321.3m)		N/A
Total	**£20m (£1,200m)**	**£85m (£5,029m)**	**£80m (£4,739m)**	**£68m[76] (£4,025m)**

Source: Thames Water; Thames Water (2007), Taking Care of Water – The Next 25 Years (2010-2035), p. 67; Thames Water (2008), Five-Year Plan from 2010 to 2015, Draft Report, p. 88-89

Detailed investment information for the region is available for the period from 2010 to 2015 and more approximate costs are available for 2015 to 2020. Projects will be funded by revenue from Thames Water customers averaged over the whole Thames Water region. Long-term costs have been evaluated for the Thames Tideway project due for completion in 2020.

Adequacy of Existing and Committed Infrastructure

Currently, sewerage infrastructure is close to capacity within Camden and as a result there is a significant risk of surface water flooding. Sewer flooding is disproportionately high in Camden due to a number of factors, including the number of basement flats and low lying sewers and the design of Camden's system as a combined sewer which means that rainwater mixes with foul sewage[77].

[74] Estimated Camden cost is based on population equivalent: Camden population is 0.234m; Thames Water Region population is 13.5m.

[75] The total cost for Thames Tideway Tunnel is given; with the cost spread across two development phase periods reflecting the construction programme for the project. Consequently the cost has been spread evenly to calculate total expenditure.

[76] 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; Thames Water (2007) *Taking Care of Water – The Next 25 Years (2010-2035),* p. 67.

[77] North London Waste Plan (2008), *North London Strategic Flood Risk Assessment (SFRA)*, Mouchel Group Limited.

Around 90 properties have been affected by sewer flooding in the past 10 years according to Thames Water records. Sewer flooding occurred in 1975 and more recently 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 level[78]. The floods of August 2002 affected areas north of the Euston Road, and primarily in West and South Hampstead (NW2 and NW6 postcode areas), parts of the NW3 postcode area, in Kentish Town (NW1 and NW5), and in a number of other roads elsewhere. In response, Thames Water undertook improvements to the sewers in West Hampstead in Holmdale Road, Pandora Road, Solent Road and Sumatra Road in a project completed in 2008[79]. Properties on the Thames Water Sewer Flooding Database in the Camden area were known to be at risk of flooding in 2003, but the severity and frequency was not considered high enough to place all of those properties on the prioritisation programme for 2000 to 2005[80]. There is no evidence to suggest that improvements have been undertaken other than the West Hampstead alleviation scheme therefore as a precautionary approach, it can be assumed that the areas affected in 2002 are still susceptible to surface water or sewer flooding.

There are potential gaps in provision where insufficient sewerage infrastructure is available to support new development. Under the Water Industry Act, Thames Water have limited powers to prevent connection ahead of infrastructure upgrades, as developers have an automatic right to connect to the sewers system once their development has been granted planning permission. It is therefore recommended that the Council should engage with Thames Water to ensure that the proposed development is accounted for as part of any planned infrastructure improvement works.

[78] The Floods Scrutiny Panel, in their June 2003 report 'Floods in Camden' concluded that floods "will always occur that are beyond the capacity for cost effective sewers to deal with". Two causes were attributed to the sewer flooding:

> *"Owing to the excessive rainfall the main sewer system became completely full and under what is technically known as 'surcharge pressure', forcing the water to find whatever outlet it could – not only back onto the streets through manholes and gully gratings but also unfortunately into residents' homes directly, at basement and ground floor level. Even were the gullies to have been blocked, this would have made no difference: the flood water could not drain to the trunk sewer. (In addition) Thames Water's evidence confirmed that the flooding was caused by its sewer system reaching maximum capacity very quickly so that the roads could not be drained at the rate the rain fell."*

[79] London Borough of Camden (April 2009). *Draft Camden Multi-Agency Flood Plan*, p. 8.

[80] London Borough of Camden (June 2003). *Floods in Camden, Report of the Floods Scrutiny Panel*, p. 41.

5.3. Estimating Future Demand

Provision Standards

The provision standards that will be used to calculate the demand for new sewerage infrastructure arising from economic and population growth are based on the standard industry procedure used to design adoptable sewers[81] as shown in **Table 5-3**.

Table 5-3: Sewerage Provision Standards

Development		***Provision Standard***
Residential		200 L/day per person
Commercial	Low water use (offices, retail)	1.1 L/s per 10,000 sq m
	Intermediate water use	1.35 L/s per 10,000 sq m
	High water use (industrial)	1.6 L/s per 10,000 sq m

Source: Water Research Council (2006), Sewers for Adoption, 6th Edition

Since most of the commercial development in Camden 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 10,000 sq m has been used in the calculations.

The assessment is an approximation and makes a number of assumptions including:

- The volume of sewage treated per customer will remain the same in 2026
- The surface water flow is not considered
- The number of Thames Water customers increases at a constant rate from now until 2026.

Even though there are measures to reduce water consumption, including the Code for Sustainable Homes for new developments and the introduction of water metering, historic trends have always shown that water consumption tends to rise with increasing living standards. Given the two opposing trends, water consumption is assumed to remain constant.

These factors are all unknown at this stage and the assessment is therefore based on the limited information currently available. However calculations using the two methods yield similar volumes of sewage for the period 2006-2026. URS is therefore confident that Thames Water is using these estimates to calculate the associated infrastructure requirements.

Issues/ Future Trends

The factors driving sewerage infrastructure improvements include legal obligations, climate change and population growth:

[81] Water Research Council (2006), *Sewers for Adoption, 6th Edition*, clause 2.12.2.

- 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.

Without further investment, the existing sewers system would have insufficient capacity to cope with future development anticipated within Camden. The anticipated increase in rainfall intensity due to climate change is estimated to be 5% in the period up to 2025[82]. 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 also increase pressure on sewers. Investment in treatment works will be required to meet increasingly stringent water quality targets.

The projected residential and commercial growth in Camden will necessitate increased capacities of the network, treatment works and sludge disposal. Average household occupancy (currently 2.08[83]) is anticipated to decrease, which is expected to result in an increase of per capita water use. However, metering of household water should counteract increased demand: meters will be installed in 28% of households by 2010 and 84% by 2025. The implementation of Sustainable Urban Drainage Systems (SUDS) in new developments will also be an important measure mitigating increased run-off from developed areas[84].

In the future, new legislation will further increase quality standards, driving future investment in treatment works improvements, that Thames Water plan to address through the aforementioned Thames Tideway Tunnel.

In future years, existing assets will continue to require routine maintenance. The total length of sewers to be maintained by Thames Water across its entire area will increase from 68,000 to 108,000 km by 2015. In addition, investment is required to reduce sewer flooding and reduce odour from sewage treatment works. Cleaning and repairs will be

[82] CLG (2007), *Planning Policy Statement 25, Development and Flood Risk*, Table B2

[83] London Borough of Camden (2008), *Shaping Camden, Camden's Local Development Strategy, Core Strategy Preferred Approach*, as published for consultation in November 2008

[84] 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 and methods suitable for urban environments are available such as porous paving and rainwater harvesting.

increased in sewers where blockages are known to occur. As discussed in **Section 5.2** sewer flooding is disproportionately high in Camden due to the number of basement flats and low lying sewers and the fact that rainwater is mixed with foul sewage. **Table 5-4** presents a summary of the factors that may have an impact on the predicted investment plans.

Table 5-4: Potential Factors Affecting Future Required Investment in Sewers in Camden

Customers	***Assets***	***External Environment***
Demographic changes: Increasingly mobile and/or transient population makes it difficult to predict demand for sewerage services Evolving public expectations regarding level of service, e.g. sewer flooding and river water quality 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 & WC flushing) demand may be reduced	Innovations in treatment technology such as fuel cells Efficiency improvements such as automated monitoring 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	Extent of climate change may differ from predictions Downturn in the economy will constrain investment; market forces will affect demand and price for sewage services 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: Thames Water (2006) 'Taking Care of Water – The Next 25 Years (2010-2035)', p. 13

5.4. Demand for Sewerage Infrastructure arising from Growth

Thames Water own and maintain the sewerage infrastructure in Camden and it is their responsibility to provide infrastructure improvements necessary to future development.

An increase in sewage flows could result in the need for additional infrastructure both at the local level – e.g. additional sewers serving new development and improvements to the local sewers network – and at the strategic level.

The growth areas in Camden where new infrastructure will be required include Kings Cross (which borders with the LB Islington), Tottenham Court Road (bordering on Westminster), Euston, Holborn and West Hampstead Interchange. Additional growth is expected to come forward in the north east and north west sub-areas, as well as in the south sub-area (outside the growth areas).

Using the same approach presented in **Section 5.2** URS calculated the predicted future sewage volumes based on the rate of 319 L/day per customer calculated from Thames Water data. Based on this method, the baseline sewage flow is 73.2M l/day as shown in

Table 5-1 whereas the additional sewage flow by 2026 is 14.3M l/day, resulting in a total sewage flow in 2026 of 87.5 l/day.

Table 5-5 shows the estimated flow rates resulting from new residential and commercial development by growth area up to 2026. In terms of the Thames Water and URS' assessment, it is not possible to compare the figures shown in **Table 5-5** with information from Thames Water. However, the total flow of 87.5 l/day is approximately equal to 85.5M l/day[85]. Therefore, this indicates that the assumptions used by Thames Water to inform their planned infrastructure investment to 2026 are likely to be adequate.

[85] This is equal to a 319 l/day consumption rate per customer multiplied by the total 2026 residential population in Camden of 267,888.

Table 5-5: Sewage Flow Rates in Camden's Growth Areas Type of Development, 2006 to 2026

		Sewage Flow Rates (Litres/Day) by Development Phase				
		2006-2011	***2011-2016***	***2016-2021***	***2021-2026***	***Total (2006-2026)***
Kings Cross	Residential	31,236	436,389	344,518	-	812,144
	Non-Residential[86]	42,701	1,327,481	1,327,481	1,327,481	4,025,146
	Total	*73,938*	*1,763,871*	*1,671,999*	*1,327,481*	*4,837,290*
Euston	Residential	25,724	184,202	413,422	89,575	712,923
	Non-Residential	-	23,760	431,066	407,306	862,133
	Total	*25,724*	*207,962*	*844,488*	*496,881*	*1,575,056*
Tottenham Court Road	Residential	64,310	87,737	69,363	-	221,410
	Non-Residential	119,474	119,474	119,474	119,474	477,895
	Total	*183,784*	*207,211*	*188,837*	*119,474*	*699,305*
Holborn	Residential	-	20,671	-	-	20,671
	Non-Residential	79,646	79,646	79,646	79,646	318,584
	Total	*79,646*	*100,317*	*79,646*	*79,646*	*339,255*
West Hampstead Interchange	Residential	5,053	135,051	144,238	183,743	468,085
	Non-Residential	874	874	39,229	39,229	80,207
	Total	*5,927*	*135,925*	*183,467*	*222,972*	*548,292*
Other - South	Residential	663,312	785,501	539,745	604,974	2,593,532
	Non-Residential	286,975	286,975	286,975	286,975	1,147,900
	Total	*950,287*	*1,072,476*	*826,720*	*891,949*	*3,741,431*
Other - North East	Residential	576,493	366,567	298,582	305,473	1,547,116
	Non-Residential	18,049	65,569	46,561	22,801	152,979
	Total	*594,542*	*432,136*	*345,143*	*328,273*	*1,700,095*
Other - North West	Residential	305,473	196,605	163,991	155,722	821,790
	Non-Residential	20,425	20,425	20,425	20,425	81,699
	Total	*325,897*	*217,030*	*184,415*	*176,147*	*903,490*
Total	**Residential**	**1,671,601**	**2,212,724**	**1,973,858**	**1,339,486**	**7,197,670**
	Non-Residential	**568,144**	**1,924,204**	**2,350,857**	**2,303,337**	**7,146,544**
	Total	**2,239,746**	**4,136,929**	**4,324,716**	**3,642,823**	**14,344,214**

Source: URS calculations based on joint analysis by London Borough of Camden and URS Corporation.

5.5. Resulting Sewerage Infrastructure Requirements

The additional flows predicted in **Table 5-5** could translate in the need for 7 new or renovated sewage treatment works (SWT) as well as new and renovated sewers[87].

[86] Commercial includes office, retail and leisure developments.

[87] This is calculated based on the Thames Water Information presented in **Table 5-7** and scaled down to Camden (1.72% population compared to TW region) and extrapolating this 10 year period to 25 years.

However it has not been possible to identify the specific infrastructure requirements arising from growing sewage flow rates within this study. This is partly due to the lack of detailed baseline information on the adequacy of the network within Camden (apart from the evidence on sewers flooding presented in **Section 5.2**).

Additionally, as further discussed in **Section 6.4**, intensive modelling is necessary to accurately predict the impact of the estimated additional sewage flows on the sewerage network at both the local and strategic levels. The reason for this is that Thames Water classes information about the specific location of required improvements or expansions as confidential, so that the utility company alone is in the position to undertake a structured and detailed investigation to address the proposed developments in tandem with both climate change issues and the increasing maintenance requirements of an aging and under-capacity sewerage system.

However Camden reports the findings of an initial estimate of sewerage infrastructure requirements, and reports that[88]:

> *"Initial modelling (by Thames Water) indicates that local infrastructure improvements are likely to be required for the opportunity areas and areas of intensification, specifically Kings Cross and Euston. The existing strategic, 'trunk' infrastructure is likely to be able to accommodate growth levels."*

Phasing

Sewerage infrastructure is planned and funded over five-yearly investment programmes. 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 scope of this report extends to 2026 which is one year into the AMP 8 period of 2025-2030. **Table 5-6** shows the additional sewage flows that the projected residential and commercial developments are expected to generate in five years periods up to 2026.

[88] London Borough of Camden (2008), *Shaping Camden, Camden's Local Development Strategy, Core Strategy Preferred Approach*, as published for consultation in November 2008, p. 107.

Table 5-6: Phasing for Sewage Rates 2006 to 2026

	Development Phase				
Growth and Sub Area	***2006-2011***	***2011-2016***	***2016-2021***	***2021-2026***	***Total (2006-2026)***
Kings Cross	73,938	1,763,871	1,671,999	1,327,481	**4,837,290**
Euston	25,724	207,962	844,488	496,881	**1,575,055**
Tottenham Court Road	183,784	207,211	188,837	119,474	**699,306**
Holborn	79,646	100,317	79,646	79,646	**339,255**
West H'stead Interchange	5,927	135,925	183,467	222,972	**548,291**
South	950,287	1,072,476	826,720	891,949	**3,741,432**
North East	594,542	432,136	345,143	328,273	**1,700,094**
North West	325,897	217,030	185,415	176,147	**903,489**
Total	**2,239,746**	**4,136,929**	**4,324,716**	**3,642,823**	**14,344,214**

Source: URS calculations

5.6. Funding

As discussed in **Section 5.2**, Thames Water is responsible for sewerage infrastructure provision in Camden. Across their entire area, current Thames Water maintenance expenditure is on average £1bn per year. Thames Water plans to invest a total of £6.5bn between 2010 and 2015 in both water supply and sewer services, and a total of £27bn over the next 25 years. Sewerage investment in 2010 to 2015 in the AMP 4 period will total £4.2bn.

Local Infrastructure

Expansions or improvements to local infrastructure will be funded as a result of direct negotiations between Thames Water and developers, so that it is not possible in this report to estimate the scale of resources available. Information from the Thames Water AMP 4[89] shows that for the whole of the Thames Water region, TW expect to develop a total of 151.5 km of new sewers, which will be funded through revenue plus additional fees paid by developers.

Camden's Core Strategy Preferred Approach confirms that developers will be expected to contribute towards more local sewerage infrastructure required to support new developments. Section 1.18 of the Core Strategy Preferred Approach states[90]:

> *"Where a development generates the need for new or upgraded infrastructure, on- or off- site, either to support the development or mitigate its affects, the Council will*

[89] Thames Water (2008), *Five-Year Plan from 2010 to 2015, Draft Report*, p. 88-89

[90] London Borough of Camden (2008), *Shaping Camden, Camden's Local Development Strategy, Core Strategy Preferred Approach*, as published for consultation in November 2008, p. 26

expect contributions towards provision meet this need. Necessary infrastructure may include utility services, such as … sewerage."

Section 3.26 further states that[91]:

"The potential for surface water flooding should be considered when designing buildings … and allocating uses for lower floors in … areas (known to be at risk from flooding) … new development in these areas can provide the opportunity to contribute to improved drainage and sewerage capacity. The Council will require development to adequately manage potential increases in surface water or sewage discharge, introduce appropriate mitigation measures and take account of known sewer flooding problems to avoid increasing drainage problems and flood risk down stream."

Strategic Infrastructure

Under the current planning regime, where there is insufficient sewer capacity and no improvements are programmed, it is the individual developer's responsibility to negotiate with Thames Water to ensure that the network will be able to support the additional flow, and that the effluent quality is compliant with environmental requirements. The developer is required to prove that such discussions have taken place and to demonstrate how any improvement will be funded and associated funding arrangements have been agreed with Thames Water. This may result in the risk that an individual developer is not able or willing to fund the necessary sewer upgrade, and decides not to go ahead with the development, which would present a barrier to the development. In the case of Camden however, Thames Water's initial modelling presented to the Council suggests that whilst local infrastructure improvements may be necessary in Camden's growth areas, it is unlikely that the existing strategic infrastructure will require works to sustain the additional sewage rates from expected growth.

Investment in sewerage infrastructure will be subject to financial risk. Thames Water is a private company and the proposed £30bn investment needed to finance their investment plans will come from a range of capital markets, with the risk of an increasing cost of borrowing. Also, any major scheme will be subject to high risks that are common to large scale construction projects, albeit mitigated by OFWAT regulation of cost efficiency targets[92].

[91] Ibid. p. 52

[92] The scale of the proposed investment will exceed the capacity of any single debt market, therefore the company will require access to a wide range of capital markets. Large projects such as the Thames tunnel may require funding in alternative ways to better define and allocate risk, as these projects have a different risk profile to a standard capital programme. To regulate prices, Ofwat sets cost efficiency targets every five years and benefits of cost savings are hence shared with sewerage customers. In summary there is a risk that the costs of the proposed investment may increase due to both the cost of borrowing and due to the high risks involved in major construction projects, but these are controlled to an extent by Ofwat to protect consumers from excessive price increases.

5.7. Summary and Recommendations

Summary of Infrastructure Requirements Assessment

For the reasons identified in **Sections 5.1** to **5.4** it is not possible within this report to definitively conclude an assessment of specific infrastructure requirements for Camden between 2006 and 2026.

However, Thames Water has developed a plan for the entire region for which they are responsible, and the identified schemes are presented in **Table 5-7** below. Based on TW's plan presented, the additional flows predicted in **Table 5-5** could translate in the need for seven new or renovated sewage treatment works (SWT) as well as new and renovated sewers[93].

Table 5-7: Summary of Infrastructure Requirements (Thames Water region)

Infrastructure Item	*Where & Area*	*When (Trigger Point or Period)*	*Who to provide?*	*Funding Source*
Sewers to be renewed	121.6km 136.3km Location not known	2010-2015 2015-2020	Thames Water	Thames Water revenue
Sewers to be renovated	79.5km 95.0km Location not known	2010-2015 2015-2020	Thames Water	Thames Water revenue
New sewers	36.8km 114.7km Location not known	2010-2015 2015-2020	Thames Water	Thames Water revenue plus additional fees paid by developers
New/refurbished intermittent discharges (storm overflows)	47 41 Location not known	2010-2015 2015-2020	Thames Water	Thames Water revenue
New/refurbished treatment works	77 90 Location not known	2010-2015 2015-2020	Thames Water	Thames Water revenue
New/refurbished pumping stations	24 40 Location not known	2010-2015 2015-2020	Thames Water	Thames Water revenue
Offices, labs, depots, workshops	10,000m^2 10,000m^2 Location not known	2010-2015 2015-2020	Thames Water	Thames Water revenue

Source: Thames Water (2008). Five-Year Plan from 2010 to 2015, Draft Report, p. 50.

[93] This is calculated based on the Thames Water Information presented in **Table 5-7** and scaled down to Camden (1.72% population compared to TW region) and extrapolating this 10 year period to 25 years.

Recommendations

In light of the fact that it has not been possible to conclude specific infrastructure requirements arising from the projected residential and commercial growth in Camden, it is suggested that the following actions are pursued to meet the requirements on PPS12[94] to properly plan for infrastructure to support the spatial development plans illustrated in Camden's *Core Strategy Preferred Approach*.

Engagement with Thames Water would ensure that the sewerage network has adequate capacity to accommodate the anticipated residential and commercial growth, so as not to constrain development. As part of this the Council may consider commissioning a network impact assessment at a strategic level[95], addressing sewer-flooding hotspots in West and South Hampstead and in Kentish Town as a priority. Thames Water has undertaken sewer alleviation works in 2008 to the West Hampstead area so this area may now have sufficient capacity.

Routine maintenance operations to roads and paved areas are also a key opportunity for the Council to take preventative action and replace impermeable surfaces with permeable systems that will reduce the quantity of surface water runoff and hence mitigate flooding. Retro-fitting of SUDS should be implemented where feasible, e.g. on council estates and public realm open spaces. These measures would reduce surface water runoff to the combined sewer network, potentially significantly. Surface water input was not incorporated into the calculations because it is not known what extent of external surface area drains to the Thames Water network; detailed information on the Thames Water network (sewer size, length) is unknown; and the extent of current surface water attenuation and restricted discharge is unknown. LBC should implement SUDS schemes and technologies wherever possible and private developers should be encouraged to do so. It is assumed that the status quo in terms of sewage treatment is maintained. However, policy drivers such as the emerging Water and Flood Management Bill and the Code for Sustainable Homes, aim to promote SUDS which treat water close to the source before it enters the combined system, with the added benefit of minimising new infrastructure.

[94] CLG (2008), *Planning Policy Statement 12: Local Development Framework*.

[95] Thames Water is expected to charge the Council in the order of £50,000 to conduct such investigation, see also **Section 6.5**.

6. FLOOD RISK

6.1. Introduction and Overview

Introduction

Camden's *Core Strategy Preferred Approach* recognises the need for development to support new or upgraded infrastructure, both on and off site, either to support the development or to mitigate its affects. The flood defence infrastructure is inclusive of the sewerage network that is a main source of flooding within Camden.

An areas flood risk is defined as the likelihood that the area will flood now or in the future. Flood risk can come from a variety of sources such as groundwater, sewer, surface water, fluvial (river), and tidal. Flood risk can be influenced by changes in watercourse conditions due to the effects of climate change or siltation. Structural or operational failure of flood defences or sewerage infrastructure can also result in flooding. Flood defences have been historically built within and along the banks of rivers, canals and reservoirs to protect developments from flood risk. Flood mitigation infrastructure can include attenuation basins and tanks, over sized sewers and sustainable drainage systems (SUDS).

The London Borough of Camden is located in an Environment Agency Flood Zone 1. This indicates that the borough is located outside of the extent of the 1 in 1000 year return period flood event originating from the River Thames (both flooding from fluvial or tidal sources) or other rivers in north London such as the River Lee to the east of the borough.

The dominant source of flooding within the borough is surface water flooding either through surcharging of the sewerage network due to overloading or from overland flow caused by run-off from higher areas which is unable to drain to the sewerage network. This flooding has been historically concentrated in the north and the west of the borough.

There are additional lesser flood risks to specific areas of the borough associated with the Regents Canal and the Hampstead Heath reservoirs.

Flood defences for Camden are maintained and upgraded by a variety of bodies including:

- Utility Companies (Sewerage Infrastructure)
- British Waterways (Canals)
- Corporation of London (Hampstead Heath Reservoirs)
- London Borough of Camden (Highways Drainage and Land Drainage).

Policy Overview

There are a number of standards that provide guidance on flood risk and defence including: *Planning Policy Statement 25 (PPS25): Development and Flood Risk*; The

London Plan; local authorities' *Strategic Flood Risk Assessment* and local planning guidance (within the Unitary Development Plan or Local Development Framework). These standards are intended to help reduce the amount of surface water generated by proposed developments by requiring the implementation of sustainable drainage systems (SUDS) and encouraging the implementation of flood resilient architecture.

Sir Michael Pitt reported in June 2008 his findings into the widespread UK flooding that occurred during the summer of 2007[96]. The Pitt report identified 92 separate proposals including measures such as that local authority ensure developers make full contributions to the costs of building and maintaining necessary flood defences. Many of these recommendations have been carried forward into the Draft Flood and Water Management Bill that was issued for consultation on 21st April 2009.

6.2. Existing and Committed Infrastructure Provision

Flood Risks and Flood Defences in Camden

The *North London Strategic Flood Risk Assessment* (SFRA)[97] identifies Camden's potential sources of flood risk as being groundwater, sewer, surface water, canals and reservoirs. Each of these has been assigned a degree of risk as high, medium or low corresponding with the results determined in the SFRA, summarised in **Table 6-1.**

Table 6-1: Sources of Flooding and the Degree of Risk (in accordance with the findings of the SFRA)

Sources of Flooding		
Tidal	***Groundwater, Reservoirs, Canals and Fluvial***	***Sewer and Surface Water***
None	Low	Medium

Source: North London Waste Plan (2008), 'North London Strategic Flood Risk Assessment (SFRA)' Mouchel Group Limited.

Groundwater Flooding

For Camden, the *SFRA* reports low groundwater flooding concerns. To this end, Camden should continue to work with General Aquifer Research Development and Investigation Team (GARDIT)[98] to mitigate the problem. GARDIT has been able to

[96] Sir Michael Pitt (2008), *The Pitt Review, Learning Lessons from the 2007 Floods*, Cabinet Office.

[97] North London Waste Plan (2008), *North London Strategic Flood Risk Assessment (SFRA)* Mouchel Group Limited.

[98] The Team was set up in 1992 by Thames Water Utilities, London Underground Limited and the Environment Agency (EA).

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[99].

Reservoirs

The two small reservoirs on Hampstead Heath and Regents Canal could pose additional potential flood risk. If the dams retaining these water bodies fail then the areas surrounding them would be inundated with water.

Sewer and Surface Water Flooding

The risk of sewerage and surface water flood risk is considered to be medium in the borough. This condition is due to the combination of foul and surface water that characterises the majority of water sewers in the borough, which 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. Schemes such as the Thames Water Utilities planned London-wide network improvements along with the proposed Thames Tideway Tunnel[100] scheme will provide increased capacity in the sewerage network and provide sewerage overflow attenuation.

In addition, the topography in Camden attributes to regular surface water flooding. The *Floods in Camden: Report of the Floods Scrutiny Panel*[101] states that:

> *'Historical research showed that the topography of Hampstead and the nature of summer thunderstorms make high rainfall levels and flooding events a recurring feature in Camden. These phenomena have a long history and have not been recently created by global warming. Comparisons are drawn in the report between the 1975 floods in Camden and those in 2002, showing marked similarities'.*

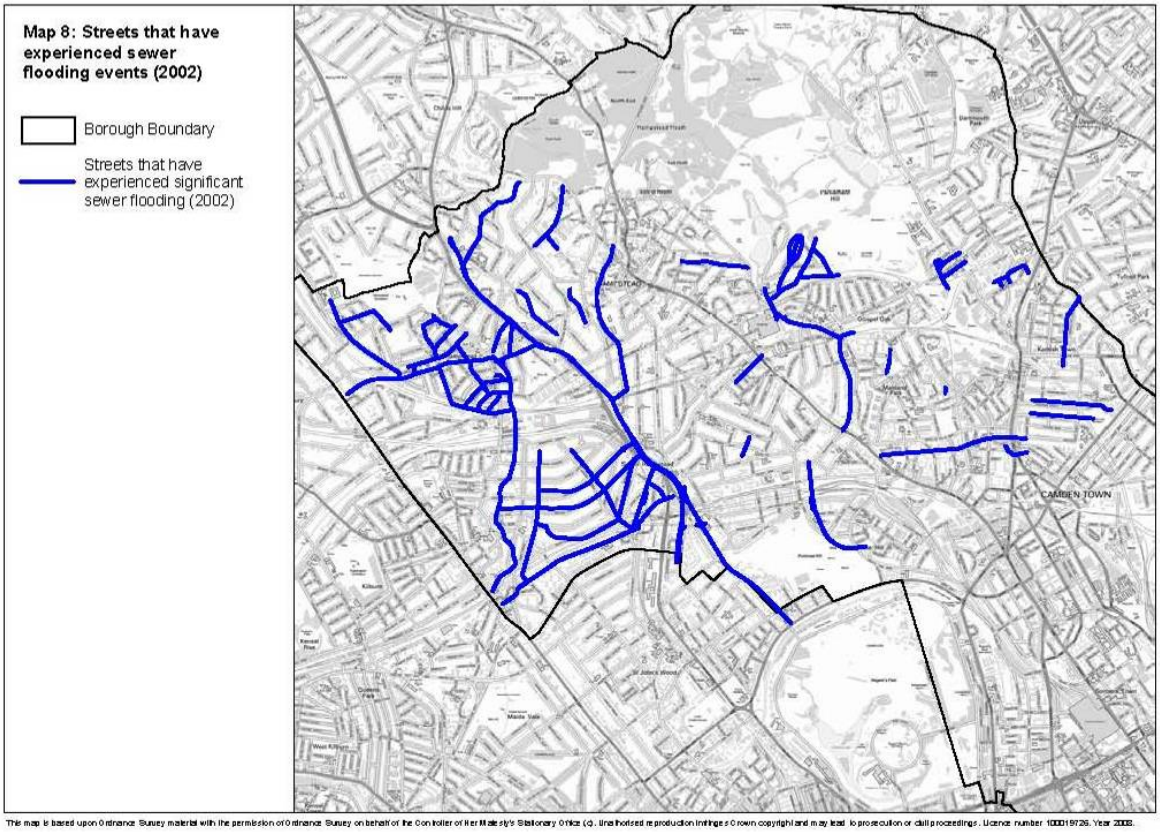
Figure 6-1 below shows the extent of flooding stemming from sewers and overland flow that occurred during an extreme rainfall event in 2002. It can be seen that the worst affected areas are in the north and the north west of the borough where overland flow from Hampstead Heath contributed to the causes of the flooding.

[99] While groundwater is not directly potable; it can be used for industrial processing, spray irrigation, topping up of wildlife ponds, dust suppression, and other various non-potable uses. It could also be used as a source for water treatment plants.

[100] See **Section 7.1** for further details on the scheme.

[101] London Borough of Camden (2003), *Floods in Camden: Report of the Floods Scrutiny Panel*.

Figure 6-1: Recorded Historical Sewer and Surface Water Flooding in the North of Camden



Source: London Borough of Camden (2008), 'Core Strategy Preferred Approach', London Borough of Camden.

Flood Risk Management

Camden is under medium flood risk from sewers and surface water flooding from the combined foul and surface water sewerage network within Camden, which falls under the authority of Thames Water. Therefore the Council is unable to determine where and when network improvements will be undertaken as the precise locations for flood relief schemes to be addressed in the borough is classed as confidential information within Thames Water's business plan[102].

However the Council is able to restrict the surface water runoff from new developments by requiring that all new development or redevelopment schemes coordinate with TW as part of the planning application process and adhere to the Mayor of London's *Water*

[102] Please refer to **Section 5.2** for a more detailed discussion of the improvements undertaken by Thames Water to the sewers in part of the 2002 flooded areas in a project completed in 2008. There is no evidence to suggest that improvements have also been undertaken elsewhere.

Matters[103], Proposal 7. This proposal states that the London boroughs will require new developments (larger than 1,000 sqm or more than 10 dwellings) to manage their surface water runoff so that there is a 50 per cent reduction in the volume and rate of surface water drainage when compared to that of the undeveloped site at peak times.

London Plan Policy 4A.14 states that 'Developers should aim to achieve greenfield run-off from their site through incorporating rainwater harvesting and sustainable drainage'. However it is recognised that this target may not be feasible on large developments with 100% existing impermeable surfaces. This is due to the huge volumes of water generated from site run-off that would require storage or an alternative means of management at the development site.

This coordination will help to ensure that proposed developments only discharge into the sewerage network flows which are consented by Thames Water based on local network capacity considerations. In particular, it will help address internal sewer flooding (i.e. within residential buildings), which is disproportionately high in Camden due to both the number of basement flats and the aging combined trunk sewer network which is now under capacity for the peak flows that it is being required to accommodate.

Planned Investment

Thames Waters *Proposed Business Plan* for the *AMP5* period (2010-2015)[104] includes an allowance for flooding relief at 4,726 properties within the Thames Water region that have suffered from recurrent flooding. Within this total there will be 450 separate flood relief schemes within the London boroughs[105]. The business plan will become final issue in April 2009 with approval from OFWAT expected in autumn 2009.

The utility company funding cycle that Thames Water operates within dictates that funding for relief schemes for sewer flooding is addressed for the next AMP period solely.

Thames Water's Taking Care of Water[106] initiative looks at the long term 25 year forecast at a strategic level. This report states Thames Waters' intention to eliminate high-risk internal flooding by identifying areas at risk of flooding and prevent the flooding before it occurs. This is programmed in tandem with adapting the sewerage system to cope with climate change. There are no specific proposals currently available relating to Camden.

The proposed 32 kilometres Thames Water Thames Tideway Tunnel scheme will capture the flows of sewage from 34 sewer overflow points along the River Thames from Hammersmith to Beckton and transfer it to the Beckton sewage treatment works. This

[103] Mayor of London (2007), *Water Matters, the Mayor's Draft Water Strategy, Draft for consultation with the London Assembly and functional bodies*, GLA.

[104] Thames Water (2008), *Five-Year Plan from 2010 to 2015, Draft Report*, Thames Water.

[105] The available data does not break down the locations into individual London boroughs.

[106] Thames Water (2007), *Taking Care of Water – The Next 25 Years (2010-2035)*, Thames Water.

scheme will help to alleviate some of the flood risk due to sewers and surface water over-capacity in the lower reaches of Camden closer to the River Thames but not in the northern part of the borough where the worst sewer flooding has historically occurred[107]. This is due in part to the topography of the borough and in part to the sewerage system in the north of the borough remaining at full capacity (due to volume of flow originating at the high end of the sewer catchment area).

Adequacy of Existing and Committed Infrastructure

As discussed in **Section 5.2**, in August 2002 a series of thunderstorms flooded numerous properties in West and South Hampstead and parts of Kentish Town. An investigation into this event determined that while the Camden highway drainage gullies functioned properly, the Thames Water carrier drains were unable to accommodate all of the rainfall causing a surcharged condition and causing sewage to back up and come out of the highway gullies.

In addition to surcharged carrier drains causing highway drainage not to function properly, some gullies are damaged by statutory undertakers during the installation of utilities such as underground electric lines, gas mains and telecommunications cabling. Often when a gulley is damaged the statutory undertaker does not repair it nor does it notify Camden's Engineering Services department. Hence, currently 2% of the 19,000 gullies in Camden are classified as 'non-runners'. The approximate annual budget for the Engineering Services department to repair these gullies is £200k. However this budget only covers the repair of 6.4% of the drains in need of repair[108]. In some cases where Engineering Services has been notified in a timely manner of the damaged gulley and it is clear that it has been damaged by a statutory undertaker's works, the statutory undertaker can be compelled to pay for the repairs.

6.3. Estimating Future Demand

Policy Requirements

There are a variety of national, regional and sub-regional documents providing guidance on flood risk and defence including *Planning Policy Statement 25 (PPS25): Development and Flood Risk*, the *London Plan* and the *North London Strategic Flood Risk Assessment*.

[107] The Thames Tideway Tunnels are driven by ecology-based legislation i.e. the EU Urban Wastewater Directive. There may be associated relief to flooding in the lower catchments of the London Borough of Camden but it is impossible to quantify without detailed knowledge of the tunnel levels and intensive modelling. See **Section 5.2**: Sewers in this report for further details.

[108] In most cases, the statutory undertaker has completed their works and has been off site for months before the damage is noted by a resident or maintenance personnel. It costs approximately £8,000 to repair each non-running gulley.

The local planning guidance, Camden's *Replacement Unitary Development* Plan (UDP) (June 2006), also provides guidance in Policy SD9 - Resources and energy, Part B – Water; which states:

> *'In considering proposals for development, the Council will need to be satisfied that adequate provision can be made for water supply and waste treatment. The Council will only grant planning permission for development that it considers is sited and designed in a manner that does not cause harm to the water environment, water quality or drainage systems and prevents or mitigates flooding. The Council will require developers to include measures to conserve water and where appropriate incorporate Sustainable Urban Drainage Systems [SUDS]'.*

These standards should help reduce the amount of surface water generated by proposed developments by requiring the implementation of SUDS[109] and of flood resilient architecture

In Camden's *Preferred Development Policies*[110] document, two of the preferred planning policies are relevant to flood defence and flood risk: Preferred Policy DP10 – Promoting Sustainable Design and Construction and Preferred Policy DP12 – Water. Both policies refine the current UPD water policy by expecting schemes to be designed in line with sustainable development principles, by requiring developments to:

- Implement green/brown roofs and green walls wherever suitable
- Limit run-off to prevent flooding, therefore aiming for a 'greenfield' run-off rate
- Limit the amount and rate of run-off and waste water entering the combined sewer by the use of SUDS.

The *SFRA* states that the emergency management plans and supporting inundation mapping recommended by the Pitt Review[111] are likely to become a legal requirement from spring 2009[112]. Chapter 19 - *Effective Management of Dams and Reservoirs* of The

---

[109] The *North London Strategic Flood Risk Assessment* (SFRA) scored the potential usage of various SUDS measures within the London Borough of Camden against criteria relating to hydrological performance, land use characteristics and physical site features. The results showed that on and off line storage tanks were likely to be commonly appropriate for use, swales, green roofs and pervious pavements would often be viable but ponds (attenuation or infiltration) and infiltration methods would be inappropriate in the majority of developments (largely due to the land take required on smaller development sites).

[110] London Borough of Camden (2008), *Shaping Camden, Camden's Local Development Strategy, Core Strategy Preferred Approach*, as published for consultation in November 2008

[111] Sir Michael Pitt, (2008), *The Pitt Review, Learning Lessons from the 2007 Floods*, Cabinet Office

[112] Since the publication of the SFRA the Government has drafted a *Flood and Water Management Bill* which is currently under consultation. The approved Bill, once published, will provide details on whose responsibility it will be to prepare inundation maps for large and small reservoirs.

Pitt Review 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 *North London SFRA* anticipates the forthcoming legislation by recommending that these documents be prepared for the Highgate Pond No.2 (capacity 36,000m³) and Highgate Pond No.3 (capacity 46,000m³) on Hampstead Heath to provide a more accurate appraisal and assessment of flood risk presented by the reservoirs. Although the reservoirs are owned and operated by the Corporation of London, the Council may need to assist the Corporation of London with the preparation of these documents dependent on the wording of the legislation.

Sir Michael Pitt's Review of the Summer 2007 floods stated that *Local Surface Water Management Plans* (SWMP) as set out in PPS25 and co-ordinated by local authorities should provide the basis for managing all local flood risk (Recommendation 18). The roles to be adopted in the production of these documents by the Local Authorities, Utility Companies and Environment Agency will be further defined within the new *Flood and Water Management* (2009).

The *SFRA* also recommended a detailed assessment of the flood risk caused by Regents Canal to the surrounding properties in close partnership with British Waterways.

Future Trends

The SFRA has identified the potential areas of inadequacy in the borough's flood defences. The risk of flooding in these locations will be increased by climate change affects over the lifespan of the borough's Core Strategy.

The extensive flooding reported during the extreme event in August 2002 indicates that the sewerage system in South and West Hampstead in the north west of Camden may become increasingly overloaded in future storm events which will have an increased peak rainfall intensity due to climate change effects and only part of the affected areas have since been subject to improvements[113]. The system needs therefore to be adapted to cope with climate change.

All the measures that are likely to be required to address flood defence and flood risk issues arising from climate change are made even more essential because of the projected growth in the borough.

6.4. Preparing for Growth

Coupled with climate change, residential and commercial growth are likely to result in increased flood risk. The expected levels, location and phasing of growth in Camden up to 2026 means that developments will be at risk of flooding, primarily from sewers or via surface water overland flow linked to sewer incapacity. However flood defence initiatives are not triggered by any specific level of development.

[113] See **Section 5.2.**

Also, the projected developments could increase flood risk elsewhere within Camden's boundary and beyond.

Therefore, projected growth is expected to strengthen the need for both additional physical infrastructures to be delivered and further investigation to be conducted, so as to ensure that both the flood risk affecting future developments and arising from them can be adequately assessed and mitigated.

Infrastructure Needs

According to the Council's growth trajectory West Hampstead Interchange and the north west sub-area of the borough are expected to grow by 6,449 additional residents by the year 2026. Following the 2002 flooding in the area, Thames Water has conducted an improvement programme in West Hampstead, concluded in 2008. However the scheme only covered a limited portion of the streets that suffered from the flooding. As such, the resulting increase in sewer base flow should be addressed by the Council with Thames Water on a strategic level at the earliest possible time[114].

The south sub-area, which is expected to host an additional 21,803 residents over the same planning period (including Euston, Kings Cross, Holborn and Tottenham Court Road), will also require detailed investigation by Thames Water into the necessary improvements to the sewerage system capacity to accommodate these developments.

In light of the above the Council can actively contribute to lessening flood risk in the future by:

- Require SUDS implementation on development sites wherever viable within the planning process. Maintenance costs to rest with the developers unless future developments hasten the process of adoption of SUDS by the utility companies.
- Ensuring surface water attenuation of minimum 50% of peak flow for brownfield redevelopment sites in accordance with the Mayor of London's *Water Matters Proposals*. On site storage facilities to be maintained by the developers.
- Promoting the *London Plan* Policy 4A.14 target for developers to restrict surface water run-off from sites to greenfield run-off rates. This target may be more viable on smaller development sites.
- Maintaining and updating its drainage to address highway flooding from non-adopted drainage.
- Encourage water efficiency measures to reduce the volume of grey water from forthcoming developments that will be discharged into the combined sewerage network.

[114] See **Sections 5.3** and **5.7**.

- Retrofit SUDS measures onto housing estates and open spaces under borough ownership. Section 106 agreements can specify contributions from developers to assist in the funding for these measures in areas with higher flood risk.

Further Investigation and Analysis

There are a number of actions that the Council should pursue to further the assessment of future flood defence requirements or to address and mitigate existing and future flood risks.

As suggested above, the Council should liaise with Thames Water to address sewer incapacity and flooding on a holistic catchment level. As Thames Water classes information about the specific location of required improvements or expansions as confidential, the Council should engage with TW regarding the proposed areas identified for population growth. This would ensure that Thames Water undertakes a structured and detailed investigation to address the proposed developments in tandem with both climate change issues and the increasing maintenance requirements of an aging and under-capacity sewerage system.

In the future the Council will be required to consider all sources of flooding within a *Surface Water Management Plan* to be written in accordance with PPS25 and the *Flooding and Drainage Bill (*2009). The Surface Water Management Plan will form a crucial document in focusing attention on specific flood locations within the borough over the mid to long term planning period. Remedial capital works for the Council to consider can be identified through this document.

In anticipation of the emergency management plans and associated inundation mapping recommended by the Pitt Review becoming a statutory requirement within the forthcoming *Flooding and Drainage Bill* (2009), the *SFRA* also recommended that these documents be prepared for the two small reservoirs on Hampstead Heath to provide a more accurate appraisal and assessment of flood risk presented by Highgate Pond No.2 and Highgate Pond No.3 both owned and operated by the Corporation of London. Whilst legislation is still evolving with this respect, it is likely that the London Borough of Camden may need to assist the Corporation of London with the preparation of these documents.

The *SFRA* also recommended a detailed assessment of the flood risk caused by Regents Canal to the surrounding properties in close partnership with British Waterways. This is essential to address flood risk stemming from their assets and required increases in the standard of flood defence to be applied to their assets over the next 20 years. The analysis would identify the locations of raised canal banks that could pose a flood risk and the condition of the raised canal banks. If there are raised canal banks, Flood Management Plans and inundation mapping should be undertaken to determine the extent a breach in the bank would affect the adjacent properties.

The Council should also undertake regular reviews to the London Borough of Camden *Multi-Agency Flood Plan* and update as necessary[115]. This plan covers the requirement for a multi-agency response to a flood incident in the London Borough of Camden. Following the surface water flooding events throughout the UK in 2007 it was agreed that a multi-agency flood plan (MAFP) would be produced for Camden, to tackle the specific and bespoke impacts and actions required in response to a flood incident.

Resource Requirements

A number of the infrastructure items and further analyses would require The London Borough of Camden to set financial resources aside over the 2006-2026 planning period.

Since surface water and sewerage flooding are of medium risk in Camden, efforts to improve these conditions should be considered as being of highest importance. The Council should consider setting aside more funds towards the maintenance and repair of highway drainage within the borough. The current budget for highway drainage maintenance appears inadequate to maintain an operating network of gullies and additional funding (URS suggest a minimum increase of +50% on the current budget per annum) should be considered to address this issue.

As noted, the combined foul and surface water sewerage network is under the authority of TW, so that the Council is unable to determine where and when network improvements will be undertaken. A detailed investigation into the borough's combined sewerage system by Thames Water would ensure that the proposed increases in population projected across the entire borough are addressed and strategic remedial measures to their network are identified. The Council should set aside the necessary funding to commission the investigation[116].

In addition, the Council should coordinate with statutory undertakers to determine when works will commence within the borough to address the problem of 'non runner' gullies. This will allow the Council to monitor the works' effects on the highway drainage and identify if any gullies are damaged. If the statutory undertaker damages any infrastructure, then they should be compelled to repair it at no cost to the Council, as the currently allocated annual budget only covers the repair 6.4% of the damaged drains.

The borough can take preventative action when undertaking capital works to roads and paved areas by replacing impermeable surfaces with permeable systems (i.e. reservoir pavements) that will reduce the quantity of surface water runoff and hence mitigate flooding.

[115] A Draft of the recently updated plan was published for consultation in April 2009.

[116] Thames Water is expected to charge the Council in the order of £50,000 to conduct such investigation.

The London Borough of Camden should also set aside funds for the Regents Canal flood risk analysis, as recommended by the SFRA. At this time there are no funds allotted to this task in the three year budget for the borough[117].

6.5. Summary

Summary of Infrastructure Requirements Assessment

Camden's Core Strategy Preferred Approach identifies a projected residential growth of 35,988 within the borough by 2026. The SFRA has identified the sewers and overland surface water flow as a source of medium flood risk. Other sources of flooding within the borough have been identified as low risk.

Recommendations

In light of the fact that it has not been possible to conclude specific infrastructure requirements arising from the projected residential and commercial growth in Camden, below is a summary of actions that it is recommended that the Council progress, often in coordination with other organisations, to address both existing provision shortfalls and to comply with existing and forthcoming legislation. All these measures will assist with the projected delivery of new housing and commercial developments within the borough.

As a consequence of the 5 year *AMP* (Asset Management Plan) funding cycle followed by Thames Water, flooding schemes are typically identified and addressed solely within this timeframe. To address long term planning issues the Council needs to engage Thames Water and progress a structured and detailed investigation with them. The investigation would need to cover the entire borough, paying particular attention to the south and north west sub-areas of the borough and all growth areas. Thames Water will charge for this investigation and, considering the scope of the developments proposed, the investigation is likely to be lengthy and involve detailed network modelling[118]. It is recommended that the Council afford the investigation high priority and undertake it jointly with neighbouring boroughs. The sewerage network catchment crosses legislative boundaries and hence blockages and under-capacity within sewers located in other boroughs can have a consequence on sewer flooding within Camden.

It is important for the Council to continue to exercise its influence during the planning process to ensure that all new developments follow the flood defence/flood risk standards discussed in **Section 6.4** thereby reducing the amount of surface water runoff flowing into the TW sewerage network.

Council will be responsible for highway flooding from non-adopted drainage and the Council should identify any financial shortfall in maintaining and updating its drainage.

[117] An estimated cost for this Flood Risk Analysis would be between £20-30,000.

[118] Significant funding will be required to undertake this comprehensive investigation.

The Council should consider setting aside more funds towards the maintenance and repair of highway drainage.

In addition, the Council should determine an efficient way to coordinate with statutory undertakers to determine when works will commence within the borough. This will allow the Council to monitor the works' effects on the highway drainage and identify if any gullies are damaged. If the statutory undertaker damages any infrastructure, then they should be compelled to repair it at no cost to the Council, therefore reducing the resources that the Council itself needs to allocate for such repairs.

In future the Council may be required to consider all sources of flooding within a Surface Water Management Plan, which will need to be written in accordance with the emerging *Flooding and Drainage Bill*. The Council's Surface Water Management Plan will be an important document linking sewer flooding with the land drainage issues causing flooding by run-off from the higher areas such as Hampstead Heath to the north of the borough. Remedial measures to address land drainage flooding can be identified through the Surface Water Management Plan.

Also important, although perhaps of lesser priority, should be the preparation of emergency management plans and associated inundation mapping for the two small reservoirs on Hampstead Heath as well as a detailed assessment of the flood risk caused by Regents Canal to the surrounding properties. The Council should assist the Corporation of London in the preparation of the emergency management plans and associated inundation mapping for the reservoirs on Hampstead Heath. Due to the size of the reservoirs, the development of these documents may involve the services of a Panel Engineer[119].

The Council is also expected to coordinate with British Waterways to undertake an analysis of Regents Canal and its flood risk to the surrounding properties. Not completing this task would not hinder development of the areas adjacent to the canal today, but as time passes and the canal and its barriers age, this issue may become a more significant priority.

Finally, the Council should undertake regular reviews to the London Borough of Camden *Multi-Agency Flood Plan* and update as necessary.

[119] All reservoirs under the Reservoirs Act 1975 must be inspected and supervised by a Panel Engineer. Panel Engineers are a group of specialist civil engineers appointed by the Secretary of State to one of the panels under the Reservoirs Act 1975 for a period of five years. They are responsible for the design and supervision of construction, the supervision of measures in the interests of safety, inspection of reservoirs and the ongoing supervision of reservoirs that hold at least 25,000m³ of water above natural ground level.

Table 6-2: Summary of Actions

Action	*Where & Area*	*When (Trigger Point or Period)*	*Who to provide?*	*Funding Source*
Structured and detailed investigation of the sewers system	Throughout the Borough	Current	Thames Water	London Borough of Camden
Highway Drainage Maintenance	Throughout the Borough	Current	London Borough of Camden	London Borough of Camden
Surface Water Management Plan	Throughout the Borough	Late 2009-2010	London Borough of Camden	London Borough of Camden
Regents Canal Flood Risk Analysis	Regents Canal	Current	London Borough of Camden	London Borough of Camden
Flood Management Plans and inundation mapping	Two reservoirs on Hampstead Heath	Late 2009-2010	Corporation of London	Corporation of London
Thames Tideway Tunnel	London	2012	Thames Water Utilities	Thames Water Utilities

PART C – WASTE

7. WASTE MANAGEMENT

7.1. Introduction and Overview

Approximately 2.5 million tonnes of waste (including municipal solid waste, commercial and industrial, construction, hazardous and agricultural waste) are produced every year across North London[120], which is enough to fill the Emirates Stadium twice over. In 2005/2006 North London generated just over 950,000 tonnes of municipal solid waste (a mix of residential and commercial waste), and 1.6 million tonnes of commercial and industrial waste (non-municipal)[121]. The decomposition of waste, which has been disposed of in a landfill site, produces greenhouse gases that may contribute to climate change and it is considered a waste of resources to bury potentially recyclable materials.

The traditional ways of dealing with it (for example, exporting it to landfill sites outside London or incineration) are becoming increasingly unacceptable, both financially and environmentally. It is therefore essential that the approach to dealing with waste changes, taking more responsibility for dealing with it within London.

In the UK, local authorities have responsibilities for Municipal Solid Waste[122] (MSW) collection and/or waste disposal for all households within their area. Therefore this report focuses on the management of this waste stream only.

Local authorities with these responsibilities 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, whereas a waste disposal authority is a local authority (usually a county council), which is

[120] North London is considered to include Camden, Barnet, Enfield, Islington, Hackney, Haringey and Waltham Forest.

[121] North London Waste Plan (2008); *Issues and Options Report; North London Joint Waste Development Plan Document*, pages 8, 19 and 20. Figures for Construction, Demolition and Excavation Waste are not available for North London.

[122] The Environment Agency defines Municipal solid waste (MSW) as:

> *Household waste and any commercial or industrial waste collected by the waste collection authority or its agents. It includes collected household waste, street cleaning and litter, bulky household and civic amenity waste, commercial and industrial waste collected by or on behalf of the authority under section 45 of the Environmental Protection Act 1990, waste from council premises, parks and gardens waste, beach cleaning waste and fly-tipping clearance.'*

http://publications.environment-agency.gov.uk/pdf/GEHO0707BMYP-e-e.pdf, Accessed 09/03/2008.

responsible for disposing of municipal solid waste. Unitary authorities are responsible for both the collection and disposal of municipal solid wastes.

In Greater London the majority of the local authorities have "pooled" into four joint statutory waste disposal authorities, each of which is responsible for both the collection and disposal of wastes from households in their areas. Camden is part of the North London Waste Authority (NLWA), together with the London boroughs of Barnet, Enfield, Islington, Hackney, Haringey and Waltham Forest[123]. This section will therefore consider Camden's future waste management needs in the wider context of the NLWA area.

[123] The other joint statutory waste disposal authorities are:

- East London Waste Authority, which includes the London Boroughs of Newham, Barking and Dagenham, Redbridge and Havering
- 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 boroughs 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 in Central London.

Source: North London Waste Plan (2008), *Issues and Options Report; North London Joint Waste Plan Development Plan Document*.

Municipal Solid Waste - Any waste collected by or on behalf of a local authority. It generally comprises waste generated by households as well as local businesses and other organisations such as schools and local authorities' own waste

Commercial and Industrial Waste - Wastes from trade and business premises and from industrial installations

Construction, Demolition and Excavation Waste - Waste from all construction activity

Hazardous Waste - Waste that poses a present or potential hazard to human health or the environment

Agricultural Waste - Waste generated on farms or other agricultural premises such as market gardens. It includes both natural (organic) and non-natural wastes including for instance discarded pesticide containers, packaging waste, etc.

7.2. Existing and Committed Provision

Municipal Solid Waste Generation

Municipal solid waste (MSW) is defined as household waste and any commercial or industrial waste collected by the waste collection authority or its agents. It includes collected household waste, street cleaning and litter, bulky household and civic amenity waste, commercial and industrial waste collected by or on behalf of the authority under section 45 of the Environmental Protection Act 1990, waste from council premises, parks and gardens waste, beach cleaning waste and fly-tipping clearance[124].

Within MSW, commercial waste is defined by Camden Council[125] as follows:

- Waste from an office, shop, showroom or hotel

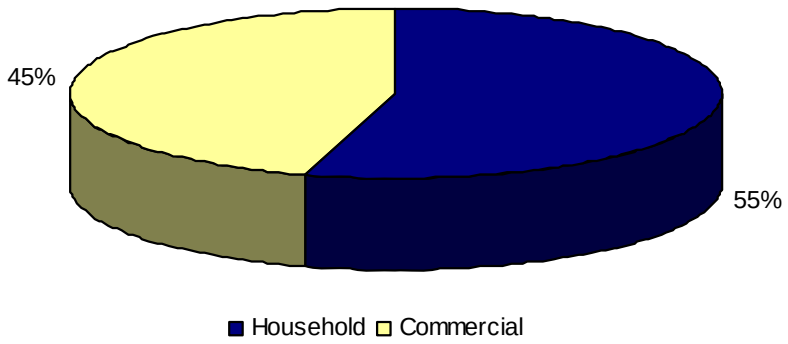
[124] Environment Agency, Your Waste Your Responsibility, Fact sheet on Treatment of Municipal Solid Waste

[125] http://www.camden.gov.uk/ccm/content/environment/waste-and-recycling/commercial-waste/waste-storage-requirements-a-guide-for-developers-of-commercial-and-residential-properties.en?page=6.

- Waste from any part of a residential premises which is used for the purposes of a trade or business or where occupants are not subject to Council Tax for that property
- Waste from premises occupied by a club, society or any association of persons (whether incorporated or not) in which activities are conducted for the benefit of the members
- Waste from a court; a government department; local authority; a corporate or an individual appointed to discharge any public functions; or a body incorporated by a Royal Charter
- Waste from a charity or church
- Waste from a tent pitched on land other than a camp site
- Waste from a market or fair.

Camden is part of the North London Waste Authority and is responsible for collecting over 132,000 tonnes of MSW every year. Out of the total MSW, around 72,000 tonnes is household waste and the remainder is commercial waste, as illustrated in **Figure 7-1** further shows the types of MSW generated in the borough[126].

Figure 7-1: Waste Streams Managed by Camden Council

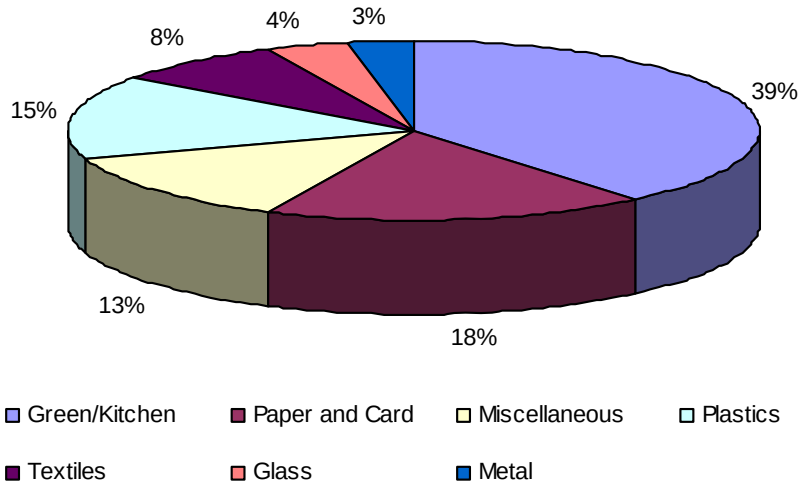


Source: London Borough of Camden; Let's talk rubbish! Camden's Waste Strategy 2007-2010 (revision 1, 2008); Published February 2009.

The types of MSW generated in the London Borough of Camden comprise 39% Green/Kitchen waste, 18% Paper and Card, 13% Miscellaneous, 15% Plastics, 8% Textiles, 4% Glass and 3% Metal as shown in **Figure 7-2**.

[126] London Borough of Camden (2009), *Let's talk rubbish! Camden's waste strategy 2007-2010 (revision 1, 2008)*. Further details on non-municipal solid waste in Camden are not available.

Figure 7-2: Types of Municipal Solid Waste Generated in Camden



Source: London Borough of Camden; Let's talk rubbish! Camden's Waste Strategy 2007-2010 (revision 1, 2008); Published February 2009.

According to the NLWA of the total MSW generated in North London, 18% is recycled, 35% is sent for energy recovery in Edmonton[127] and 47% is disposed of to landfill. Comparisons with London as a whole, where 64% of MSW is disposed of to landfill, shows that North London is currently managing its waste higher up the waste hierarchy i.e. by recycling more and disposing of less to landfill[128]. In 2007/8, Camden achieved a recycling rate of 27.2%, which is higher than the average rate reported for North London.

Municipal Solid Waste Management

Municipal Solid Waste Streams

Camden Council informed URS[129] that non-recyclable ("residual") household and commercial wastes are collected together ("commingled") in Veolia Refuse Collection Vehicles (RCVs). These are either taken by road to Hornsey Street Waste Transfer Station (WTS) in Islington and then by road to the Edmonton Energy from Waste (EfW) facility, or taken to a WTS in Hendon and then by rail to landfill in Bedfordshire.

Recyclable waste is collected by Veolia RCVs and taken by road to Hornsey Street WTS as described above. From here, the waste is taken to a variety of Materials Recycling

[127] Consultation that URS undertook with Camden Council and NLWA suggests that green waste (e.g. from composting) is likely to be included in the 18% recycled figure, whilst the Edmonton plant does not accept it.

[128] North London Waste Plan (2008), *Issues and Options Report; North London Joint Waste Plan Development Plan Document*. No details for Camden were available; consultation with Richard Bradbury was inconclusive.

[129] London Borough of Camden, Street Environment Services, 15/04/2009.

Facilities (MRFs) within north London for segregation. The NLWA stated[130] that the segregated recyclables are then transferred to a variety of outlets and provided a list of those used as of March 25th 2009 (see **Table 7-1**). It should be noted that the outlets frequently change.

Green (garden) waste is collected by Veolia RCVs and transferred by road to the in-vessel composting facility at Edmonton. The London Borough of Camden sub-contracts the management of abandoned vehicles to Redcorn Ltd in Tottenham for depollution.

According to the NLWA[131], if a MRF cannot accept the recyclable waste delivered e.g. due to lack of capacity, the NLWA would take the recyclable waste to another MRF for processing, rather than transfer it to landfill. Similarly, the NLWA can transfer green waste to other composting facilities in Essex and Cambridgeshire if the in-vessel composting facility at Edmonton is at capacity. If the EfW facility at Edmonton could not accept waste due to lack of capacity or significant maintenance work being carried out, the NLWA has less flexibility than with other waste streams. In this case waste would be transferred by road to landfill e.g. in Bedfordshire. However, the NLWA reported that this is very rare and it is more likely that the EfW facility would store the waste on site until it could be processed.

Wastes deposited by householders at the reuse and recycling facility in Regis Road are transferred to a variety of outlets. These include the following[132]:

- Green waste is transferred to the Edmonton in-vessel composter
- Paper and cardboard is transferred to the Hornsey WTS
- Fridges and Freezers are transferred to EMR Ltd in Willesden
- Metal waste is transferred to G D Metal Recycling Ltd in Edmonton
- Residual waste is transferred to the EfW facility at Edmonton.

[130] NLWA, Policy and Development, 15/04/2009.

[131] Ibid.

[132] London Borough of Camden, Street Environment Services, 15/04/2009

Table 7-1: Camden Recyclable Waste Flow

Material	*Destination*	*Comments*
Aluminium cans	Swindon, Dunstable and Warrington	
Steel cans	Hartlepool, South Wales, Canning Town	
Glass	Brentford, Suffolk, Charlton and Dagenham	At the first 3 locations the glass is processed into aggregate, at the last it is processed into new glass
Plastic bottles	Lancashire, London	
Mixed plastics	Leicestershire	
Newspapers and magazines	Essex	
Mixed paper	Kent, Sweden, Spain and China	
Cardboard	Kent	
Paper and cardboard	Kent and then on to China Newport and Rhymney, Wales Kent	Some of the material is reprocessed in the UK e.g. in Newport and Kent, some is taken to a port in the UK and then sent to paper mills abroad

Source: NLWA, Policy and Development, 15/04/2009.

Waste Management Facilities in Camden

Current municipal solid waste management facilities located in Camden include:

- 96 on street recycling collection banks
- A reuse and recycling centre at Regis Road
- Recycling collection facilities in schools
- Recycling banks outside tube stations and on busy streets for commuter litter.

Camden Council does not own a RCV depot. Vehicles are stored by Veolia at its depot in Alperton (Brent). According to the Council[133] there are no issues regarding space or capacity at this depot should the number of RCVs required by Camden (currently 67) increase in the future.

Camden Council's Waste Management Services

Camden Council provides various waste management services for its municipal solid waste customers, which are summarised in **Table 7-2** below.

[133] London Borough of Camden, Street Environment Services, 15/04/2009

Table 7-2: Waste Management Services Provided by Camden Council

Waste Stream	*Management Method*	*Comment*
Household white goods	Free collection from LBC	Unknown how this is treated further.
Household garden waste	Free collection from LBC	Unknown how this is managed further.
Commercial waste	Collection	Unknown how this is treated further, possibly as per non-recyclable MSW below.
Household compost	Provision of subsidised composting bins	Reused at point of generation.
Household cotton nappies	Subsidies for reuse	Unknown how this is treated further, possibly as per non-recyclable MSW below. The Council has advised that the provision of a subsidised cotton nappy scheme is aimed at reducing the waste produced by use of disposable nappies.
Hazardous waste	Collection	Unknown how this is treated further, possibly as per non-recyclable MSW below.
Paper	Recycling collection from underground stations and shopping areas	This scheme won a National Recycling Award for the best Local Authority Initiative.
Household (estates) paper, glass, cans and textiles	Approximately 490 “estates” recycling sites in the London Borough of Camden.	Scheme started in 2002 with £2.3 million funding from the London Recycling Fund.
Household paper, glass, cans and textiles	Around 96 on street recycling points	Transferred to Materials Recovery Facility (MRF) in Greenwich.
Household commingled recyclables	Doorstep collection scheme	Transferred to Materials Recovery Facility (MRF) in Greenwich.
Household biodegradable wastes	Doorstep collection service	Comprises mixed kitchen and garden waste although Camden has trialled separate collections. Waste is collected in sacks weekly/fortnightly.
Non-recyclable MSW	Collection	Incinerated in Energy from Waste plant at Edmonton or landfilled in Cambridgeshire or Bedfordshire.

Waste Stream	*Management Method*	*Comment*
Motor vehicle lead acid batteries	Collected at Reuse and Recycling Centres	Recycled.
Household batteries	Kerbside collection or from Reuse and Recycling Centres.	The household battery reprocessor is G&P Batteries, based in the Midlands - the batteries are not reprocessed overseas[134]
Household-derived construction waste	Collected at Reuse and Recycling Centres and from North London borough highway maintenance activities.	Reused at one of 28 identified[135] construction and demolition facilities in North London - Camden Plant Limited in the London Borough of Waltham Forest.

Source: North London Waste Authority (2008), Draft North London Joint Waste Strategy; London Borough of Camden (2009), Let's talk rubbish! Camden's Waste Strategy 2007-2010 (revision 1, 2008); London Borough of Camden, Street Environment Services, 30/04/2009.

Camden has entered into a waste management partnership contract with Veolia for 7 years, which commenced in 2003 and has just been extended beyond 31 March 2010. Through this contract, Veolia undertakes Camden's waste and recycling collections and street cleansing services.

Veolia currently provides Camden with residual waste and commingled recycling collections and, under the recent contract extension, plans to introduce borough-wide green and food waste collections and separate paper and card collections, in a bid to help Camden Council reach a recycling rate of 45% by 2015[136] in line with the North London Waste Strategy.

As shown in **Table 7-2**, there are no large-scale waste management facilities in Camden, e.g. waste transfer stations, incinerators or municipal biological treatment (MBT) plants. However, **Table 7-3** below shows the types of waste management facilities available to NLWA boroughs. These sites are not distributed evenly across the area.

The vast majority of strategic facilities (facilities accepting greater than 40,000 tonnes per annum) are located broadly at the eastern end of the North London area following the Lea Valley. Some of these sites can be used to manage more of North London's waste in the future. For example, sites that currently bulk and transfer waste for landfill could

[134] London Borough of Camden, *Street Environment Services*, 30/04/2009. URS has not been able to confirm this information with reprocessor.

[135] Identified in The Mayor's Technical Assessment for Waste Management in London (2003)

[136] http://www.letsrecycle.com/do/ecco.py/view_item?listid=37&listcatid=217&listitemid=10944

instead be used as facilities that recycle or recover energy from waste within North London.

It should be noted that 74.3% of the waste passing through the sites listed in **Table 7-3** is MSW and nearly half of the waste generated in the North London Waste Authority boroughs is still sent to landfill, mostly outside London.

The Council confirmed that the NLWA is the waste disposal authority for Camden and six other north London local authorities. Local authorities pay for this service through a levy system which was previously based on the proportion of Council Tax "Band D" properties located within each borough. The system has now changed and, following a transition period, is now based on the tonnage of waste each borough passes to the NLWA for disposal. 2009 is the first year in which the levy system is entirely based on tonnage. This new system provides more of an incentive for local authorities to reduce the volume of waste they generate[137].

Table 7-3: Types of Waste Management Facility Available to NLWA Boroughs

Type of Facility	*No. Present in NLWA*	*Operating Capacity % (2007)*	*Example/Comment*
Waste Transfer Station	28	50	Hendon Rail Transfer Station, Barnet. Receives approximately 200,000 tonnes/year from Barnet, Camden, Brent and Haringey. Compactor station, which transfers by train to landfill in Bucks. Operated by Waste Recycling Group.
Metal Recycling Sites	24	70-80	The location of the facilities is unknown at this stage,
Civic Amenity Sites	7	42	Hornsey Street, Islington, includes compactors and a recycling bulking facility. Capacity approximately 50,000 tonnes. Operated by London Waste Ltd. Transfers approximately 200,000 tonnes of residual waste to Edmonton incinerator or to landfill in Beds/Bucks per year.
Physical Treatment/Materials Recycling Facilities (MRF)	7 (6 physical treatment and 1 MRF)	Assumed operating at 75% of licensed capacity of 25,000 tonnes	The location of the facilities is unknown at this stage
Incinerator	1	93	Edmonton, Enfield
Composting Plant	1	98	The location of the facilities is unknown at this stage,

Source: from North London Waste Plan; Issues and Options Technical Report; North London Joint Waste Development Plan Document; Mouchel Parkman, December 2007 with examples and

[137] London Borough of Camden, Street Environment Services, 13/03/2009.

comments from the North London Waste Authority; Draft North London Joint Waste Strategy; June 2008.

Planned Investment

The Council has been informed that the total project cost of the new NLWA contract is estimated at £7.3 billion potentially rising to £7.7 billion after taking account of the sensitivities. Based on current levy distribution this means a range of costs from £0.91 billion to £0.95 billion for Camden. This takes into account capital expenditure, operating expenditure, recycling income and Landfill Allowance Trading Scheme (LATS) expenditure[138]. It is likely that this cost is based on predicted future waste generation, rather than past generation, however this could not be confirmed from the documents reviewed.

No plans to build additional waste facility were however identified at this stage. The NLWA has just issued a North London Joint Waste Development Plan for consultation[139] , which is set to identify opportunities to provide additional waste management sites to meet waste management requirements up to 2020. However, this exercise will need to be informed by the results of the public consultation on the Issues and Options Report. The location of potential waste management sites will be the subject of further consultation as part of the production of the North London Waste Plan.

Adequacy of Existing and Committed Infrastructure

As shown in **Table 7-3**, the physical treatment/Materials Recycling Facilities (MRF), metal recycling sites, energy from waste (incinerator) at Edmonton and composting plant used by the NLWA were operating between 70% and 98% capacity in 2007.

It is understood from the Waste Manager at the Camden Council that if a waste management facility cannot accept a delivery of waste because it has reached full capacity, then waste is taken to one of the landfill sites used by the NLWA outside of London, in the landfills in either Cambridgeshire or Bedfordshire. At this stage no evidence was made available as to how often this happens, nor on the capacity that landfills used by the NLWA outside London are operating at. Therefore no conclusive comment on their available capacity can be made. Consultation with the Council confirmed this was the responsibility of the NLWA[140].

---

[138] Letter from London Borough of Camden to NLWA, dated 29th October 2008. The letter does not define or clarify what the sensitivities are. However, it later mentions “Landfill Allowance Trading Scheme (LATS) sensitivity” and “the risks associated with LATS expenditure” and therefore could be referring to uncertainties regarding future LATS expenditure.

[139] North London Waste Plan (2008), *Issues and Options Report; North London Joint Waste Plan Development Plan Document*. See **Section 7.4** for a discussion of this Plan and the likely timeline for adoption. See also **Section 7.5** for an analysis of the funding options for the new facilities.

[140] London Borough of Camden, Street Environment Services, 30/04/2009

7.3. Estimating Future Demand

Policy Guidance

The drivers for changes in waste management practices are European and national Legislation which are translated into European and national targets and waste policies, as summarised in **Table 7-4** below.

Table 7-4: Policy Drivers for Waste Management in Camden

Policy	***Requirement***
The *EU Landfill Directive*[141]	By 2010, the amount of biodegradable municipal waste going to landfill in Europe is to be reduced to 75% of the total produced in 1995
Revised national strategy[142]	National targets for re-use, recycling and composting of household waste of at least 40% by 2010, 45% by 2015 and 50% by 2020
National Indicator (NI) target 191[143]	Camden to reduce the volume of household waste produced per household per year to 503kg in 2008/9, 483kg in 2009/10 and 464 kg in 2010/11 (See text below).
National Indicator (NI) target 192	Camden to increase the percentage of household waste for reuse, recycling or composting to 30% in 2008/9, 32% in 2009/10 and 35% in 2010/11[144] (See text below).
Council's *Community Strategy*[145]	Camden has committed to making Camden "a low waste borough" and a "low carbon borough" by 2012 by making it easier for residents and businesses to follow the waste hierarchy.
The London Plan	Each London borough allocated a certain tonnage of MSW to be managed within the borough by 2020 ("self-sufficiency targets"). Camden's target is 103,000 tonnes (See text below).
Camden Waste Strategy 2007-2010[146]	Local actions to meet 4 key objectives: reduce residual household waste in Camden, maximise the resources re-used, maximise the amount of waste recycled and reduce the carbon impact of waste management.

Source: See footnotes

[141] *Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste*; Official Journal L 182 , 16/07/1999 P. 0001 – 0019.

[142] DEFRA (2007), *National Waste Strategy*.

[143] Reported in Defra, 2007, Waste Strategy for England 2007. The baseline figure or target for last year is not stated in the document as the NI target 191 is a new target. The previous target was based on the volume of household waste generated per head rather than per household. The target for 07/08 was 335kg per head and actual performance was 317kg per head. This target relates to the amount of residual waste generated (e.g. the amount of waste produced by a household which cannot be recycled or composted). It is understood that Camden's results for 08/09 will be published in a couple of weeks.

[144] In 2006/2007 Camden achieved a 27.2% recycling rate. London Borough of Camden (2009), *Let's talk rubbish! Camden's waste strategy 2007-2010 (revision 1, 2008)*.

[145] This document was referenced in London Borough of Camden (2009), *Let's talk rubbish! Camden's waste strategy 2007-2010 (revision 1, 2008)*, but was not reviewed by URS.

[146] London Borough of Camden (2008), *Camden Waste Strategy 2007-2010*.

The Council reported[147] that meeting the NI 191 and 192 targets is a challenge. Camden is joining with the other NLWA local authorities to produce an Inter Authority Agreement to help them work together more closely for 2015 and beyond. The NI191 target will be focussed on heavily in 2010 because this target is part of the Local Area Agreement. In recent years Camden has not received any significant extra investment to achieve the NI192 target. However the new waste management contract with Veolia will include a borough-wide organic waste collection and changes to the commingled waste collection. The Council anticipates that these changes will help Camden achieve both the NI191 and NI192 targets. No figures were available to confirm how the borough is progressing with the targets at this stage.

The *North London Waste Plan, jointly produced by Camden Council and the other six boroughs in the NLWA,* will consider how to manage all waste in the NLWA area up to 2020. It will identify sufficient sites to deal with this waste, potentially using a mix of facilities including recycling and composting, and using waste to produce energy. However, there may be potential implications for the implementation of the infrastructure as there may be difficulties in obtaining planning permission for some facilities. Final adoption of the Plan will take place in December 2010.

The *London Plan* also states that London boroughs should identify adequate provision for the scale of waste use identified in their development plan documents. Camden must therefore find suitable sites for facilities to manage and process the MSW it has been allocated. This allocation or 'apportionment' has been set by the Mayor as a result of a study on the suitability of each borough to host waste sites.

Future Trends

As described above, the main driver for improved waste management is legislation at the European, national and local level. Technological advances, funding and investment are driven as a result of changes to these policies, for example the diversion of waste from landfill and increases in the numbers of recycling facilities.

Consultation for the *North London Waste Plan* in 2008[148] highlighted the perceived importance of Camden's self sufficiency in waste management. Consultees were asked whether the Camden should identify just enough land to meet their apportionment or identify more land to manage waste, in order to further reduce the amount of waste being exported out of North London. The majority of respondents were in favour of making more sites available to manage even more of North London's waste, i.e. to be as self-sufficient as possible. One of the reasons for this response was concern that other areas may be unwilling to treat North London's waste[149].

[147] London Borough of Camden, Street Environment Services, 13/03/2009.

[148] CAG Consultants (2008), *North London Waste Plan Issues & Options consultation: summary of responses*

[149] See **Section 7.4** for a discussion on how the NWLA plans to address this issue.

A further comment however was received highlighting that self-sufficiency may not be feasible due to the volumes of waste produced in the area and restrictions in land availability.

Another key message was that when respondents were asked for their views on which approach would be best for determining the number, size and distribution of waste management facilities within North London, the preferred approach was a hybrid between a centralised approach that relies on a fewer number of large facilities and a de-centralised approach that is based on a larger number of smaller facilities. The hybrid approach would see sub-regional clusters of larger sites, perhaps with multiple facilities, combined with a larger number of smaller sites either supplying waste to these larger sites and facilities or bulking recyclables for onward movement.

7.4. Demand for Waste Management Facilities arising from Growth

The *London Plan* states that the projected growth of MSW generation from Camden up to 2020 is as follows:

- 2010 – 148,000 tonnes per annum (tpa)
- 2013 – 152,000 tpa
- 2015 – 156,000 tpa
- 2020 – 164,000 tpa[150].

These estimates were firstly presented in the *London Plan Early Alterations*[151] and have remained the same in the *London Plan 2008* issue. They are based on growth figures from the *GLA 2006 Round Demographic Projections*[152]; and GLA, 2006 Office of National Statistics (ONS) Mid Year Estimates. The *GLA 2007 Round Demographic Projections*[153] has revised the *GLA 2006 Round* household projections, so that the net increase between 2006 and 2026 has gone down from 15,800 (2006 Round) to 15,000 (2007 Round)[154]. However the London Plan predictions on MSW generation in Camden have not been revised following the Early Alteration issue. As described in **Section 3.1** of the *Camden Infrastructure and CIL Strategy: Overview Document,* URS residential growth projections are based on dwellings and population rather than households. Therefore it is

[150] Mayor of London (2008), *The London Plan; Spatial Development Strategy for Greater London*, GLA, p. 229.

[151] Mayor of London (2006), *The London Plan; Spatial Development Strategy for Greater London, Housing Provision Targets, Waste and Mineral Alterations*, GLA, p. 24

[152] Data Management and Analysis Group (2006), *DMAG Briefing 2006/32*, GLA.

[153] Data Management and Analysis Group (2008), *DMAG Briefing 2008/07*, GLA.

[154] The GLA confirmed that the change in household estimates would not be substantial. GLA, Data Management and Analysis Group, 02/04/2009.

not possible to directly match the Camden Infrastructure Model dwelling projections against the London Plan waste generation estimates. However, assuming that net increase in dwellings from the Camden Infrastructure Model translates into an equal increase in households[155], the volume of waste predicted in the London Plan could be considered to be in line with the projected population growth in Camden. It should be noted that figures relating to the increase in commercial space/jobs were not available for review and therefore commercial waste arisings are not included in this comparison.

The *North London Waste Plan Issues and Options Report*[156] states that both the Greater London Authority and the NLWA have estimated waste growth for Municipal Solid Waste for North London up to 2020. The Greater London Authority projection is based on 2% growth per annum up to 2020[157].

The NLWA prediction is lower at approximately 1.4 million tonnes per year. The data from NLWA's procurement model is based on applying a growth rate to 2006/07 data (actual 2006/07 data plus last quarter estimated). The growth rate is around 3% per annum, decreasing to 2.5% growth per annum from 2011 to 2020, then decreasing to 0.7% thereafter[158].

7.5. Resulting Waste Management Infrastructure Requirements

Camden's membership in the NLWA means that it does not need to host additional waste management and treatment facilities within its boundaries, but it can act together with its partner authorities to handle and manage north London waste[159]. Camden's ability to be self-sufficient in waste is limited by its built-up character and the lack of sites on which to build new waste management facilities. Also, the nature of Camden's housing stock, which includes a large proportion of flats and a significant number of homes without gardens, means there is limited space for the storage of recycling containers and reduced opportunities for home composting[160]. As a result Camden faces difficulties in encouraging its residents to use recycling and composting containers.

---

[155] This assumption is reasonable as the Camden Infrastructure Model projections also account for non self-contained units, which if unaccounted could result in a number of households higher than that of dwellings.

[156] North London Waste Plan (2008), *Issues and Options Report; North London Joint Waste Development Plan Document*.

[157] No further information is available, Ibid. p.22.

[158] 'The data from NLWA's procurement model is based on applying a growth rate to 2006/07 data (actual 2006/07 data plus last quarter estimated). The growth rate is 3% growth per annum, decreasing to 2.5% per annum in 2010 up to 2020, decreasing to 0.7% thereafter', Ibid. p.22.

[159] These include Camden, Barnet, Enfield, Islington, Hackney, Haringey and Waltham Forest.

[160] London Borough of Camden (2008), *Shaping Camden; Camden's Local Development Framework; Core Strategy Preferred Approach*. The Council however is distributing compost bins, and accordingly distributed 728

There are currently 68 waste facilities located across the NWLA area (see **Table 7-3**). However, these existing sites will not have sufficient capacity to meet all of North London's future waste needs.

Location of Additional Waste Management Facilities

As mentioned in **Section 7.1** the NWLA boroughs have not to date identified suitable additional sites for managing North London's waste, as this exercise will need to be informed by the results of the public consultation on both the *Issues and Options Report* and the *North London Waste Plan* itself. It is expected that the Preferred Options report will be published in October 2009 and will identify suitable additional sites for managing North London's additional waste.

During consultation on the Issues and Options of the *Plan*[161] most opposition was expressed to the delivery of new facilities in the Blackhorse Lane area, the Edmonton area and the North London Business Park. A small number of additional potential sites were put forward by respondents and, in addition, a number of respondents highlighted the potential of incorporating waste facilities (such as combined heat and power systems) within new developments, particularly in areas which are the focus of large scale regeneration efforts.

During the same consultation process[162], consultees were also asked about what they felt would be the best approach is for determining the number, size and distribution of new waste management facilities. Most respondents expressed support for a hybrid approach which is a combination of a centralised approach relying on a fewer number of large facilities and a de-centralised approach based on a larger number of smaller facilities. The use of smaller facilities was seen to be necessary in order particularly to:

- Achieve a more even (and fairer) geographic distribution across the seven boroughs
- Reduce the number of transport movements, particularly west-east
- Encourage people to have a closer association with waste and take more responsibility for it (such as through recycling and home composting)
- Ensure that facilities are accessible.

Future large developments may be required to include small waste management facilities. This will potentially address the fact that the existing and new housing stock will largely comprise of flats that will be unable to support an increase in home composting.

---

compost bins 2007/08, London Borough of Camden (2009), *Let's talk rubbish! Camden's waste strategy 2007-2010 (revision 1, 2008).*

[161] CAG Consultants (2008), *North London Waste Plan Issues & Options consultation: summary of responses*

[162] Ibid.

However it is also recognised that there is likely to be a need for larger facilities because of economies of scale.

The Edmonton incinerator is nonetheless being considered as one of the potential sites for additional new waste facilities. However, decisions as to the use or otherwise of the existing Edmonton facility do not rest with the boroughs as waste planning authorities. The facility has a valid planning permission and is regulated by the Environment Agency. The NLWA is currently preparing to put in place new contracts and facilities for the management of waste once the current contract with London Waste (the operators of the Edmonton facility) expires in 2014.

Energy from Waste in North London

Energy from Waste plants can treat residual waste, that is waste that is not separated for recycling purposes. They operate

> *"incineration processes in which the residual waste is subject to a combustion process at a temperature typically between 850°C and 1,000°C. (…) The process releases heat, a mixture of carbon dioxide and steam and produces ash. Other gases and pollutants generated during the process are removed before the gas is discharged. (…) Emissions from energy from waste plants are regulated by the Environment Agency and must comply with the standards set in the Waste Incineration Directive. (…)*
>
> *Energy from waste plants typically recover about 27 percent of the potential energy that is available. Some of this energy is used to run the plant and the remainder is exported to the national power supply."*

Source: North London Waste Plan (2008), Waste Treatment Facilities, Your Guide to Waste Disposal, p.19. http://www.nlwp.net/downloads/waste_treatment_facilities_leaflet.pdf

LondonWaste EcoPark, Edmonton

http://www.londonwaste.co.uk/cms_images/general_content/londonwasteecopark_.jpg

The EcoPark is one of the key destinations of the MSW generated in Camden as well as in the other NWLA partner boroughs, from which it receives recyclable and non-recyclable.

The EcoPark at Edmonton is a key waste facility in North London, owned and operated by LondonWaste.

The EcoPark operates within the waste hierarchy, offering the following waste management services:

- Recycling, including bulk recycling
- Composting
- Wood chipping
- Energy generation
- Waste disposal and transfer to landfill if no other option if viable.

The Edmonton EfW facility is based within the EcoPark and accepts a range of waste streams, including general waste (black bag waste), plastics e.g. tapes, media, discs (although a sample must be tested prior to acceptance), clothing and textiles, food waste and Japanese Knotweed, cannabis and wood (although this would have to broken into small pieces).

It does not accept green waste, electrical items, metal, oil or gas bottles or anything classed as hazardous or clinical.

Source: LondonWaste website http://www.londonwaste.co.uk/services.php;Sarah Blair, LondonWaste, e-mail dated 15 /04/2009; Wendy Lord, LondonWaste, telephone communication on 17/04/2009.

The *London Plan*[163] identifies broad locations across the capital that are suitable for recycling and waste treatment facilities, including strategic employment locations, local employment areas and existing waste management sites. None of the sites identified among the strategic employment locations falls within Camden's boundaries[164].

The NWLA boroughs have identified a number of areas for which area action plans are currently being produced or are timetabled to be produced[165]. Again, none of these are falls within Camden's boundaries.

All of the aforementioned locations will all be taken into account as part of the site identification and selection process.

Phasing

As shown in **Table 7-3**, several of the waste management facilities in North London are operating at over 70% capacity, including the incinerator at Edmonton (93%). Camden's population and resulting MSW arisings are predicted to rise and therefore Camden, along with the other NLWA boroughs, have identified the need for additional waste management infrastructure and have started consulting on these issues.

One potential "trigger point" for additional infrastructure is NLWA's work to find an additional, neutral waste management facility as an alternative to the Edmonton incinerator, which is operated by Sita and London Waste. Another trigger is the need for all NLWA boroughs to meet the apportionment targets set in the London Plan.

The Council[166] regards the proposed development behind Kings Cross railway station as a potential trigger point for additional waste tonnage and the resulting additional

[163] Mayor of London (2008) *The London Plan; Spatial Development Strategy for Greater London*, GLA

[164] Among the preferred locations the London Plan lists

- Barnet Northern Telecom Industrial Business Park (North London Business Park)
- Enfield Great Cambridge Road Industrial Business Park, Enfield Brimsdown Preferred Industrial Location, and Enfield/Waltham Forest Central Leaside Business Area Preferred Industrial Location
- Waltham Forest Blackhorse Lane Preferred Industrial Location and Waltham Forest Lea Bridge Gateway Preferred Industrial Location.

[165] An area action plan is a development plan document focused upon a specific location or area, which provides a framework for development. It forms part of the Local Development Framework. Among the areas set to be subject to area action plans are:

- Barnet – Mill Hill East, Colindale
- Enfield – North East Enfield, Central Leeside, Enfield Town, North Circular
- Hackney – Dalston, Hackney Central, Hackney Wick
- Haringey – Central Leeside
- Islington – Finsbury Park, City Fringe/South Islington
- Waltham Forest – Leyton, Blackhorse Road, Walthamstow Town Centre.

[166] London Borough of Camden, Street Management Services, 13/03/2009.

management facilities. This is due to the projected increase in construction and demolition waste but also of household and commercial waste associated with the proposed development used[167]. Because of the current economic climate however, the planning application, which has received outline permission, may change significantly (be 'reigned in') and therefore the effect that this development will have on waste arising cannot be predicted until the exact nature of the development is finalised.

7.6. Funding

Local Authorities can enter into long term fixed price contracts with private sector contractors to deliver services to specified performance standards[168]. Waste PFI schemes will help the UK meet the EU Landfill Directive diversion and recycling targets. They also encourage better partnership working between local authorities resulting in efficiency gains, more integrated waste management solutions and the benefits of economies of scale that flow from this and a more strategic approach to planning and procurement.

In the last couple of years, there has been an increase in the number of projects submitted to Defra for consideration for PFI credit support. With that increase has come an improvement in the environmental solutions being proposed. Most of the recently submitted projects have proposed long-term recycling and composting solutions in line with national targets in the Waste Strategy for England 2007; as well as diversion from landfill in excess of EU targets and ambitious waste minimisation proposals that aim to reduce waste growth to 0% per annum in the long term.

Funding is also available from other sources such as the Waste and Resources Action Programme (WRAP). For Greater London in general additional funding is available from the London Waste and 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.

Between 2005 and 2008, funding was also available through the Department of Environment, Food and Rural Affairs (DEFRA) via the Business Resource Efficiency and Waste (BREW) Programme. The programme was established to return to business £284 million of money raised over that period through the landfill tax escalator. The projects it funded included assisting the construction, manufacturing, retail, recycling and reprocessing industries to reduce waste and encourage recycling[169].

---

[167] London Borough of Camden, Street Management Services, 30/04/2009.

[168] For example, Defra was granted £280 million of funding through PFI credits in 2007/08, which will be available to help local authorities throughout the UK invest in sustainable waste management options. The PFI credits rose to £600 million in 2008/09 and £700 million in 2009/10 and 2010/11. Source: http://www.defra.gov.uk/ENVIRONMENT/waste/localauth/funding/pfi/.

[169] http://www.defra.gov.uk/environment/business/support/

Following this programme, a range of advice and support is now available to businesses and local authorities through Business Link[170] and the Brew Centre[171].

According to Camden[172], the most significant change to the way waste is managed in Camden will be when the 25-year NLWA waste disposal contract ends in 2014. Regaining this contract will require significant investment from each of the seven North London Authorities and the DEFRA. The NLWA has applied for £25 million in PFI Credits from DEFRA for the purchase and use of land and facilities for waste management operations. This cost is then re-charged back to the individual boroughs, which use the facilities, based on the volume of waste sent to these facilities, so that the NWLA authorities will also be required to contribute financially to this contract. The amount of money that Camden will have to invest has not yet been finalised.

However, as discussed in the previous sub-section, the NLWA is currently looking for alternative waste disposal sites to those already provided and this process could cause a delay to obtaining funding. If the NLWA does not secure funding by 2014, this could cause significant problems for Camden and the other NWLA boroughs and may result in them failing to achieve their recycling targets, as the waste would likely be sent to landfill outside London. It is also worth noting that the infrastructure funding is not entirely dependent on PFI and other funding options can be explored[173].

7.7. Summary

Camden faces specific challenges in managing waste. The key issue is that the borough's ability to be self-sufficient in waste is limited by its built-up character and the presence of a high number of flats and homes without gardens. As a result, Camden not only is unable to identify waste management sites within its own boundaries, but would also face difficulties in encouraging residents to use recycling containers and reduced opportunities for composting[174].

For this reason an assessment of infrastructure requirements associated with Camden's future waste management can only be conducted with reference to North London wide facilities, which Camden will use. These include the Energy from Waste Incinerator at Edmonton, the Hendon Rail Transfer Station in Barnet, the Civic Amenity Site at Hornsey Street, Islington and various metal recycling sites and MRFs. The London Plan identifies broad locations across the capital that are suitable for recycling and waste treatment

[170] http://www.businesslink.gov.uk/bdotg/action/layer?topicId=1079068363&r.s=tl

[171] http://www.lga.gov.uk/lga/core/page.do?pageId=1212811

[172] London Borough of Camden, Street Management Services, 13/03/2009.

[173] London Borough of Camden, Street Management Services, 30/04/2009.

[174] London Borough of Camden (2008), *Shaping Camden; Camden's Local Development Framework; Core Strategy Preferred Approach*.

facilities, including strategic employment locations, local employment areas and existing waste management sites. None of the sites identified among the strategic employment locations falls within Camden's boundaries, however several have been identified within north London. It should be noted that the NLWA is currently identifying the waste management sites required to meet waste apportionment across seven North London boroughs[175] and that will be the main driver for meeting waste requirements. No information was available on how often waste from LBC is turned away from a designated waste recycling/treatment/composting facility due to the lack of capacity, and so ultimately is disposed of to landfill. This would be an indicator of potential infrastructure under provision, and its absence means that a Camden wide assessment of the adequacy of existing provision in not conclusive.

Also, no details were available regarding the remaining void space at the landfills used by the NLWA outside London and therefore no analysis can be made regarding any available capacity.

Information from the *North London Joint Waste Plan Development Plan Document* suggests that the document's estimated amount of residential MSW generated in Camden up to 2026 may in fact exceed the amount that can be expected to arise based on the housing trajectory defined by URS with Camden Council for the purpose of this study. The study however does not make available information on predicted growth in commercial space, so that a thorough comparative exercise was not possible.

Camden should ensure that it follows the regulatory policy and guidance described in **Section 1.3** above. It should ensure that its partners (such as Veolia and the NLWA) assist the Council in achieving the authority's objectives and targets, such as increasing the volume of waste generated by each household.

Camden Council considers the procurement of the waste disposal contract by the NLWA in 2014[176] as key future consideration to the borough. This will require funding from each of the London boroughs and could include funding from Defra via PFI credits. Until this contract is agreed, the level of funding required from each authority and the level of service to be provided by the NLWA cannot be certain.

[175] The Preferred Options report will be published in October 2009 and will identify suitable additional sites for managing North London's additional waste.

[176] London Borough of Camden, Street Management Services, 13/03/2009.

Table 7-5: Summary of Infrastructure Requirements

Action	*Where & Area*	*When (Trigger Point or Period)*	*Who to provide?*	*Funding Source*
Use of additional waste management facilities and land	North London and outside London	NLWA contract renewal in 2014	NLWA	Government PFI Credits with contributions from individual boroughs
Inclusion of integrated waste management facilities within new developments	Future developments within Camden or other NLWA boroughs	To be included during planning stage for new development	Developer	

PART D – EMERGENCY SERVICES

8. POLICE

8.1. Introduction and Overview

Scope and Policy Review

The elements of police services covered in this section include Metropolitan Police and Safety Neighbourhood Team services in Camden.

Camden's *Core Strategy Preferred Approach* CS12 focuses on making Camden a safer place by working with developers and other organisations to tackle crime, fear of crime and anti-social behaviour in Camden's private and public spaces, including town centres and transports[177]. The Metropolitan Police corroborates the importance placed on this issue by Camden's *Core Strategy* by emphasising various crime and safety issues in Camden, including the high incidence of drug related issues, a high number of commuters, and the scale of growth that the borough is expected to face in the immediate future[178].

Policing Services and Management in Camden

Policing services in Camden are managed by the Metropolitan Police at a London-wide level and also at a local level by 18 Safer Neighbourhood Teams (SNT). The Metropolitan Police is also part of Camden's Community Safety Partnership, ensuring a joined up approach to supporting community safety in Camden.

The work of the Metropolitan Police in turn is scrutinised and supported by an overseeing body; the Metropolitan Police Authority (MPA). The MPA has a strategic management role and is not responsible for day-to-day delivery of policing. It works closely with the Metropolitan Police and its partners to secure an efficient police service for London.

Camden's Safer Neighbourhood Team was set up following a campaign launched in 2006-2007 to provide local policing management in Camden. Each team of officers is dedicated to a specific local community's safety. Each of Camden's 18 Safer Neighbourhood Teams provides additional policing support dealing with day-to-day crime and disorder issues in each of the 18 Camden's wards. The borough's SNTs are dedicated local community teams that act as an additional policing team and unit and are organised on a common basis across London. They deal with day-to-day crime and disorder issues in the local community.

---

[177] London Borough of Camden (2008), *Shaping Camden: Core Strategy: Preferred Approach*, p. 89.

[178] Metropolitan Police Estate (2007), *Asset Management Plan Camden*. The document covers the period 2007 to 2010.

Estate Management

The MPA has overall responsibility for all Metropolitan Police buildings and facilities in London and recognises the vital role the estate plays in supporting the delivery of effective and efficient policing across the capital[179]. The management of the Metropolitan Police estate is crucial to ensure an effective police service for London.

8.2. Existing and Committed Provision

Existing Provision

The Metropolitan Police in Camden

Table 8-1 shows the number of police stations, police officers, police staff and police community support officers (PCSO) based within Camden's boundaries[180].**Table 8-2** identifies a total of six police stations serving Camden and outlines the location of each station.

Table 8-1: Police Numbers per Borough as at the End of September 2008

Borough	*No. of Police Stations*	*No of Police Officers*	*No. of Police Staff*	*PCSO Strength*
Camden	5	827	169	98

Source: Camden Asset Management Plan, Metropolitan Police Estate, 2007

Table 8-2: Police Stations catering for Camden

Police Station	*Location by London Borough*
Albany Street	Camden
Holborn Police Station	Camden
West Hampstead Police Station	Camden
Kentish Town	Camden
King Cross Police Station	Islington- this police station also caters for Camden

Source: Camden Asset Management Plan, Metropolitan Police Estate, 2007

[179] Ibid.

[180] A police officer is a member of the operational police force, police staff are involved within the police estate, whilst PCSOs support the police officers.

Camden's Safer Neighbourhood Teams

Additionally, there are 18 Safer Neighbourhood Teams working in Camden assigned to Camden's three sub areas (see **Table 8-3**). Each Safer Neighbourhood Team consists of one sergeant, two constables, and three PCSOs. The SNTs are scattered across 9 basis, six of which are within the police stations of Holborn, West Hampstead, Hampstead, Kentish Town, Swiss Cottage and Albany Street.

Table 8-3: Camden's Safer Neighbourhood Teams by Sub Areas

Sub Area	***Safer Neighbourhood Team Location***
South	Bloomsbury Holborn and Covent Garden Kings Cross Regents Park St Pancras and Somers Town
North East	Camden Town with Primrose Hill Cantelowes Gospel Oak Haverstock Highgate Kentish Town
North West	Belsize Fortune Green Frognal and Fitzjohns Hampstead Town Kilburn Swiss Cottage West Hampstead

Source: Camden Asset Management Plan, Metropolitan Police Estate, 2007

Wider Metropolitan Context - Police numbers

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 PCSOs, almost 2,000 special constables and 14,000 members of police staff. This growth has placed demands on existing policing buildings and facilities[181].

Planned Investment

The *Metropolitan Police Asset Management Plan Camden* (*AMPC*) is the Camden borough specific plan setting out the key vision of the Metropolitan Police and how it is translated at into actions and initiatives in Camden for the period 2007 to 2011[182].

[181] Metropolitan Police Estate (2007), *Asset Management Plan Camden*. Consultation is ongoing with Camden's Community Safety team and police to identify Camden specific information.

[182] Ibid.

According to the *AMPC* Camden's estate is ageing, with approximately 40% of the buildings pre-dating 1935 and many being inappropriately located for today's communities' needs. Simply upgrading or renewing individual parts of the estate is not considered to be an option and there is an urgent need for major change[183].

In line with the MPA and MET *Property for Policing*[184] document, the plan illustrates proposed future plans to improve policing facilities in Camden so that they are suitable to meet the police's needs in the borough, namely:

- Safer Neighbourhoods Programme - this involves local policing and working with the local community to identify and tackle issues of concern at a local level
- New custody provision - the development of specialised custody facilities grouping 20-40 cells in one location along with ancillary facilities such as interview rooms, consultation rooms and a search suite
- Improved patrol services - the development of one single patrol base accommodating the majority of operational police officers and resources for the borough in one main building
- Front counters - a better environment for the public- the provision of a front counter to allow a joined-up up 'citizen focus' approach
- Better office accommodation - the reorganisation and improvement of back-office facilities to ensure a more efficient manner of working, organisation, and support for frontline officers.

The *AMP* highlights that new demands are constantly being made for more space and better security; however it does not provide a list of detailed and costed initiatives to meet the proposed plans for Camden. Consultation with Camden police has confirmed a long term strategy towards the modernisation and consolidation of estate and relocation of facilities if required, in order to improve response times as well as effectiveness in partnership work. The preferred model encompasses a limited number of operational police stations providing accommodation for patrol and custody units, police shop units within retail frontages in town centres, and SNT basis hosting two teams each[185].

With regard to Safer Neighbourhood Teams there is a desire to have one base per two teams which would give them a greater space. There are no plans or proposals in place.

Camden's *Core Strategy Preferred Approach* outlines key infrastructure programmes and projects for Camden's police stations for the period 2007 to 2017. This information is

[183] Metropolitan Police (2005), *Planning for the Future Police Estate.*

[184] MPA and MET (2007), *Property for Policing: Providing the Best Estate for Borough Based Policing*

[185] London Borough of Camden, Community Safety, 30/04/2009; Metropolitan Police, Camden Borough Police, 06/05/2009.

replicated in **Table 8-4. .** Consultation with Camden's police has confirmed that the schemes are to be funded through capital receipts derived from the sale of other part of the police estate; as such in the current economic climate the timescale for delivery is reliant on the improvement of property values and is all but certain[186]. The MET has however also secured a new police control/IT room and public help desk at the King's Cross Central development, delivering not less than 150 sqm of net internal area, as part of the s106 agreement for the scheme.

Table 8-4: List of Projects/Programmes for Police Provision in Camden

Project/ Programme	*Location*	*Delivery Period*	*Funding*
A new front counter at Hampstead police station	Hampstead	2017-2017	Metropolitan Police Authority
New Custody Centre	Camden Town preferred location	2007-2017	Metropolitan Police Authority
New Patrol Base	Camden Town preferred location	2007-2017	Metropolitan Police Authority
New Safer Neighbourhood bases	Unknown	2007-2017	Metropolitan Police Authority

Source: London Borough of Camden (2008), Shaping Camden: Core Strategy Preferred Approach

A constraint to Camden's police ability to deliver its aspirations is however constituted by a centralised estate planning system at the Greater London level[187].

Adequacy of Existing and Committed Provision

As stated above much of the Metropolitan Police estate in Camden is not considered to be appropriate for a modern police service, which is affects the delivery of an effective police service and safety in Camden. There is a recognised difficulty in meeting response times due to the location of the buildings, and the idea to increase motorbike usage has

[186] London Borough of Camden, Community Safety, 08/04/2009; Metropolitan Police, Camden Borough Police, Safety Neighbourhood Teams 30/04/2009.

[187] London Borough of Camden, Community Safety, 30/04/2009

been suggested[188]. The existing location of front counters is not ideal and there is a recognised shift to a more citizen focus approach[189].

The metropolitan police are looking to double the number of police constables by 2012 to ensure adequate policing when the Olympic Games begin. There are plans to recruit an additional 300 PCSOs in Camden by 2012, for whom no additional space is available. This is in the context of a wider inadequacy of the total police force numbers in Camden; consultation has revealed that Camden police feel they are under-resourced when compared with other boroughs that may have similar footfall and population size profile (for instance Westminster and Southwark)[190].

However, there are space issues when considering relocations or expansions and the metropolitan police are constantly looking at new ways to share with other agencies. In addition to this spatial issues are exacerbated by the financial crisis, which is creating difficulties in acquiring new buildings which are more appropriate.

8.3. Estimating Future Demand

Policy Guidance

The *Core Strategy Preferred Approach* CS12 provides guidance on making Camden a safer place to live. It particularly requires developers to incorporate design principles for safe and secure urban design, with a focus on tackling crime hotspots across Camden such as:

- Camden Town
- King's Cross
- Bloomsbury
- Covent Garden
- Kilburn[191].

CamdenSafe[192], Camden's community safety partnership strategy emphasises the focus on community safety in Camden by introducing actions to reduce crime and ensure safety in homes and the local community with a focus on tackling anti-social behaviour. The

[188] Metropolitan Police, Camden Borough Police, Safety Neighbourhood Teams, 30/04/2009

[189] Ibid.

[190] London Borough of Camden, Community Safety, 30/04/2009.

[191] London Borough of Camden (2008), *Shaping Camden: Core Strategy Preferred Approach*, p. 90.

[192] London Borough of Camden (2008), *CamdenSafe 2008/2011, Camden's Community Safety Partnership Strategy.*

document however does not include specific actions to address future needs stemming from Camden's projected residential and commercial growth.

Provision Standards

There is no clear guidance available at either national or local level which would indicate how to translate an increase in development (residential and / or commercial) into additional demand for police services, and thereby into demand for a new police station or SNT. Moreover, for various reasons it may be that this is neither a practical or sensible way to approach the question at hand.

Discussions with Camden Police and Camden Council have confirmed that population is not directly a driver of police force numbers, and therefore of police infrastructure. The size of territorial police force is driven by a resource allocation formula (RAF) which considers the levels of crime, the size of the existing population and the presence of potentially sensitive targets (for instance in Camden the British Museum is considered to be one). The criteria for the allocation are considered to be one of the reasons for Camden's under-resourcing: whilst lacking the concentration of sensitive targets present for instance in Westminster, areas of high footfall such as Camden are not directly considered to require additional officers[193].

Additionally, further consideration is given in the section below within the discussion regarding the demand for police services and infrastructure arising from growth.

Future Trends

Camden's *Asset Management* Plan (*AMP*) highlights that one of the key objectives for the police estate in Camden is to move away from the now predominant multipurpose centres, which include a front cover reporting desk, custody cells, space for police officers and community officers, and a variety of back office uses.

The proposed new mode of provision aims separating functions which are now delivered through the centres, with the removal of back office staff and its relocation to provide London wide services[194]. A consolidated police estate would see a shift from the current de-localised custody cells organisation to a centralised arrangement, and one patrol centre for Camden to include a space where all police officers for the borough are based. This shift in the mode of provision is considered beneficial to providing safer environments and space for the public. However, no sites have been allocated as of yet as the plans are at a strategic level.

Additional police forces are likely to be required in the future despite the increase in Camden's usual and daytime population. There is an increase need for public order operations related to more frequent spontaneous and unplanned demonstrations. The

[193] London Borough of Camden, Community Safety, 30/04/2009.

[194] Metropolitan Police, Camden Borough Police, 06/05/2009.

increase in single occupancy households increases the risk of burglaries and the police are working towards promoting safer dwellings with better front doors and locks[195].

Services will also need to evolve, to increase the public's confidence in the police force particularly with regards to the SNT model[196].

8.4. Demand for Police Services and Infrastructure arising from Growth

As mentioned in **Section 8.3,** consultations with the MPA, the MET and Camden Council indicated that the main drivers for territorial police force numbers are current level of crime and population size, and the presence of potentially sensitive targets. 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 also hospital in the area[197]. Police force needs are identified in a three-year strategic assessment cycle with annual refreshes based on performance and changes in funding availability.

Projected population growth on the other hand is not the main basis on which additional officers requirements are forecast. Because of the great variation in demographic profile across boroughs, the MPA look at the projected population arising from large scale developments coming forward on a case by case basis. An assessment is made in terms of the need and level of policing to determine the demand for each ward and therefore within the boroughs[198].

The increase in Camden's local population is likely to place demand for additional local policing services, so that the Safer Neighbourhood Team can be expected to increase in order to serve a larger population throughout the borough. This is likely to affect particularly the north west sub-area of the borough, where only one Safety Neighbourhood Team is located and an additional 4,000 people expected in the sub-area by 2026.

8.5. Resulting Infrastructure Requirements

Because of the way additional demand for police provision is assessed by the MPA, URS have not modelled additional demand arising from the projected population and jobs growth.

---

[195] Metropolitan Police, Camden Borough Police, Safety Neighbourhood Teams, 30/04/2009

[196] Metropolitan Police, Camden Borough Police, Safety Neighbourhood Teams, 30/04/2009; Metropolitan Police, Camden Borough Police, 06/05/2009.

[197] London Metropolitan Police Authority, December 2008; London Borough of Camden, Community Safety, 30/04/2009. See **Section 3.3.2** in the *Camden Infrastructure and CIL Study, Social Infrastructure Needs Assessment* for information on hospital provision in Camden.

[198] London Metropolitan Police Authority, December 2008.

With regard to phasing, The Metropolitan Police could not provide URS with any phasing of planning for new police provision because, as previously mentioned, the Met does not forecast the numbers of officers required in each local authority on a population basis.

Consultation with Camden Council and the MET has confirmed that the borough has a need for new police space at the King's Cross Central development, the delivery of police shop fronts in Camden's town centres retail frontages, and the modernisation and consolidation of estate and relocation of facilities if required.

8.6. Funding

Consultation with the MET and Camden Council has revealed that police spending levels for Camden are decided at the Greater London. The process involves a negotiation of the relative needs of each boroughs based on the already discussed criteria driving the resource allocation formula (RAF). Camden police have also confirmed that redevelopments and relocations in the borough are intended to be funded through the capital receipts from the sale of assets that are unsuitable to serve police's needs. Given the current economic climate the schemes are now on hold.

The *Policing London Business Plan*[199] sets out central government fund available to the Metropolitan Police London. The fund has been extended to cover the period of 2008/09 to 2014/15 to allow efficient investment planning and the adoption of a longer-term strategy. **Table 8-5** shows the proposed capital funding.

The capital funding is to support current initiatives such as the Safer Neighbourhoods programme; renewal of IT infrastructure to ensure meets modern operational needs; and renewal of assets such as police vehicles. However itemised spending forecast is not available.

Table 8-5: Capital Funding 2008/09 to 2014/15, £M

Funding Period	***2008/09***	***2009/10***	***2010/11***	***2011/12***	***2012/13***	***2013/14***	***2014/15***
Proposed Capital Fund	241.8	302	225.2	165.2	156.9	156.9	156.9

Source: Policing London 2008/2011 Business Plan, Metropolitan Police Authority, 2008.

[199] Metropolitan Police Authority and Metropolitan Police Service (2007), *Policing London Business Plan 2008-11*, Metropolitan Police Authority.

9. AMBULANCE

9.1. Introduction and Overview

The *Core Strategy Preferred Approach* CS11 aims to ensure the retention of existing health care facilities. The proposed policy is in line with Preferred Approach CS10 to support community facilities and services, therefore jointly sustaining the objective to achieve improved health facilities for the community[200].

The main London ambulance provider is the NHS London Ambulance Service (LAS) NHS Trust, which also manages the ambulance provision in Camden and provides free healthcare to all patients. It is a London-wide NHS Trust working closely with the police and fire services to prepare for large-scale or major incidents in London. Joint management between ambulance, fire and police services is carried out at a strategic level, and also Camden's Community Safety Partnership of which all three service-providers are part.

London Ambulance stations comprise main stations and satellite stations. Main stations include offices where managers and administrative staff are based, whilst satellite stations are smaller and act as a parking base for ambulances only[201]. Ambulance stations are not located within hospitals; rather each ambulance station is a separate premise and does not fall under hospital estate[202]. In the event of an incident the nearest available ambulance will be sent[203].

Ambulance Management

The London Ambulance Service operates in two areas, firstly Accident and Emergency (A&E) care[204] commissioned by the individual PCTs for the population each of them caters for; secondly patient transport services (PTS)[205], where the LAS wins contracts through competitive tendering[206]. The London Ambulance Trust works closely with the police and fire services to prepare for large-scale or major incidents in London.

---

[200] London Borough of Camden (2008), *Shaping Camden: Core Strategy: Preferred Approach*, p. 83 and 87.

[201] London Ambulance Service NHS Trust, External Relations, 19/03/2009.

[202] London Ambulance Service NHS Trust, Risk Information, 08/01/2009.

[203] London Ambulance Service NHS Trust, External Relations, 19/03/2009.

[204] Services in this area include responding to emergency 999 calls, providing medical care to patients across London.

[205] Services in this area include providing pre-arranged patient transport and finding of beds.

[206] London Ambulance Service NHS Trust (2007), *Strategic Plan 2006/07-2012/13*.

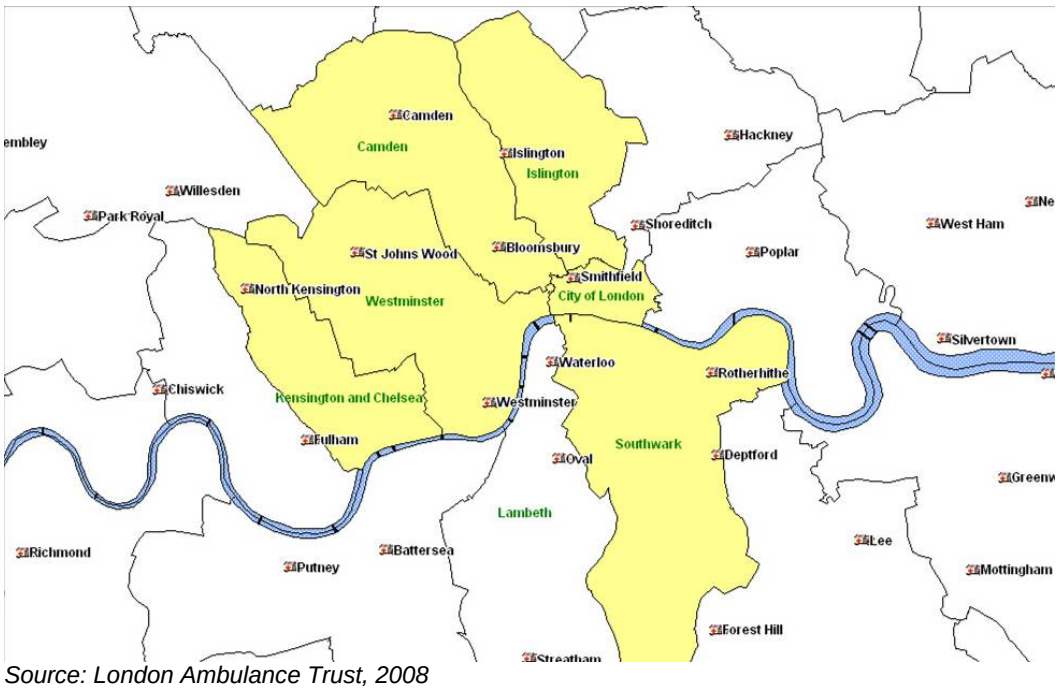
9.2. Existing and Committed Provision

Existing Provision

As discussed in **Section 9.1**, ambulance stations comprise main stations and satellite stations.

There are two ambulance stations in Camden: a station complex in the north east (known as Camden but located in Gospel Oak), and a satellite station to the Waterloo complex in the south (Bloomsbury) sub-areas, as illustrated in **Figure 9-1.**

Figure 9-1: Ambulance Stations within the Borough of Camden



Source: London Ambulance Trust, 2008

Table 9-1 illustrates the number of incidents in Camden between January 2007 and November 2008. It is important to note that figures of the month of December 2008 are not included in the 2008 statistics and therefore the numbers shown are not directly comparable.

Table 9-1: Incidents in London Borough of Camden January 2007-November 2008

Borough	*2007 (Jan-Dec)*	*2008 (Jan-Nov)*	*Total*
Camden	32,428	30,337	65,222
Total	**16,4461**	**15,4929**	**332,555**

Source: London Ambulance Trust 2008

Planned Investment

Consultation with the London Ambulance Trust has revealed that the current Estates Strategy is being reviewed so there are currently no formal plans available for ambulance provision and planned investment for the future[207].

Recent documents however highlight that the Trust has been rationalising its facilities portfolio by disposing of smaller sites. The Trust is also moving in the direction of integrated emergency and primary care provision, by pushing for PCTs to consider the opportunity of co-locating ambulance with primary healthcare services when developing any estate strategy.

The London Ambulance's business plan up to 2015 highlights the planned growth of 600 ambulance staff members in the next six months. The new ambulance staff will require new facilities. However, the distribution of the 600 additional staff members is currently unknown so that no specific infrastructure needs have been identified[208].

Adequacy of Existing and Committed Provision

The London Ambulance Service is under pressure from the increased number of 999 calls. Despite the current levels of demand, the service is continuing to reach more patients, more quickly than before[209].

Camden has adequate ambulance provision due to the two stations located in the borough and the support from stations located in surrounding boroughs[210].

9.3. Estimating Future Demand

Provision Standards

The main driver of demand for ambulance services is the likelihood of incidents requiring ambulance intervention.

The demand for ambulance provision in the borough 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 boroughs. 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 Camden[211].

---

[207] London Ambulance Service NHS, Trust, Camden Ambulance Operations 23/12/2008.

[208] London Ambulance Service NHS Trust, Camden Ambulance Operations, 01/05/2009.

[209] London Ambulance Service NHS Trust, London Ambulance Operations, December 2008 and May 2009.

[210] London Ambulance Service NHS Trust, London Ambulance Operations, 01/05/2009.

[211] London Ambulance Service NHS Trust, Camden Ambulance Operations, 19/12/2008.

Future Trends

The increase in alcohol abuse and alcohol-related harm hospital admission rates may increase the demand for ambulance provision in Camden, especially at the weekends with the expansion of the night economy, especially in terms of bars and clubs[212].

In addition this is expected to increase the already high demand for ambulance provision for three months over Christmas, three months pre August, and increase the night time economy on Friday and Saturday nights. This event will impact on the number of ambulance facilities required[213].

In addition, a reassessment of demand is generally undertaken if, for instance, a major development gets planning permission, or the council decides to make the roads one way. These events are expected to result in the need for infrastructure facilities, however, when estimating the future need for infrastructure facilities in terms of additional staff or space requirements it is done at a strategic level[214].

The 2012 Olympics is likely to bring more people into Camden as well as east London and therefore increase the demand for ambulance provision in Camden, but not to translate in the need for new physical infrastructure[215].

9.4. Demand for Ambulance Services and Infrastructure arising from Growth

Due to reasons stated above it has not yet clear if it is appropriate to model additional demand for ambulance services arising from the projected population and employment growth.

Changes in the provision of ambulance services and the associated infrastructure are driven predominantly by likelihood of incidents requiring ambulance intervention. A number of factors are likely to influence the number of incidents, including the night economy and changes in the road structure.

Increase in population due to development or redevelopment in the borough is not at this stage considered to result in an increased demand for ambulance facilities.

---

[212] London Borough of Camden (2008) *Camden Safe 2008-11: Camden's Community Safety Partnership Strategy*.

[213] Ibid.

[214] London Ambulance Service NHS Trust, London Ambulance Operations, May 2009.

[215] London Ambulance Service NHS Trust, External Relations 30/03/2009.

9.5. Resulting Infrastructure Requirements

As development of the Ambulance Estate Management plan is currently on-going, and that there is no readily available basis for modelling demand for ambulance services, a recommendation for future ambulance service requirements in the London Borough of Camden is not currently realisable[216].

The London Ambulance Service is looking to improve its existing provision and the possibility of joint working outside the LB of Camden has been suggested[217].

9.6. Funding

Detailed information on funding streams for ambulance provision is at this stage unavailable. Consultation is ongoing with the London Ambulance Service NHS Trust[218].

London Ambulance Service is predominantly funded through annually approved NHS Service Level Agreements made with each of London's PCTs. For patient transport services additional resources are available on a contractual basis from foundation trusts (secondary healthcare).

Whilst costed plans are being finalised as part of the review of the *LAS Estate Strategy*, the annual report states that one of the key areas of work over the 2006-2009 period was the reconfiguration of the estate[219]. As part of this process the Trust has disposed of a significant number of sites; this process is expected to be completed in the 2008/09 financial year.

This rationalisation is in line with the Trust's *Strategic Plan*[220] which identifies opportunities for co-location of ambulance stations with PCT facilities, recommending early engagement between PCTs and LAS to ensure that the planning of new primary and secondary healthcare facilities considers such co-location opportunities.

The London Ambulance Service is conducting preparatory work to submit a foundation trust application[221]. Should its submission be successful the Trust would have more flexibility in accessing financial resources on the private market, albeit always in line with principles of prudential borrowing.

---

[216] London Ambulance Service NHS Trust, Information Management, 23/12/2008.

[217] London Ambulance Service NHS Trust, London Ambulance Operations, 01/05/2009.

[218] London Ambulance Service NHS Trust, External Relations, 30/03/2009.

[219] NHS London (2009), *Annual Service Plan*.

[220] London Ambulance Service (2007), *London Ambulance Service NHS Trust Strategic Plan 2006/07-2012/13*.

[221] NHS London (2009), *Annual Service Plan*.

10. FIRE

10.1. Introduction and Overview

Scope

This section examines the requirement for fire fighting services and stations.

Policy

Camden's *Community Strategy* identifies the importance to prepare for fire emergencies, particularly in light of the expected growth in resident population and the number of large scale developments in the pipeline[222].

In terms of Camden's Core Strategy, provision of fire station provision is relevant to the wider context of community safety and is covered by *Preferred Approach* CS12, which focuses on making Camden a safer place by 'encouraging appropriate security and public safety measures'[223].

Fire Management

Fire provision in Camden is managed at a London-wide level by the London Fire and Emergency Planning Authority (LFEPA) which runs the London Fire Brigade. The main duty of the LFEPA is to respond to fires and other emergencies, but in recent years its work has been increasingly directed to fire prevention and community safety[224]. The London Fire Brigade is also part of Camden's Community Safety Partnership.

10.2. Existing and Committed Provision

Existing Provision

Camden has a total of four fire stations. **Table 10-1** lists the four stations and their location, illustrating an even spread of fire service provision across Camden. A station ground, that is the neighbourhoods or area that the fire station is responsible for, may include parts of a neighbouring borough. This would mean that appliances from that station could be mobilised to attend to a fire in an adjoining borough, depending on the boundaries of the station ground.

---

[222] Camden Local Strategic Partnership (2007), *Camden Together: Camden's Sustainable Communities Strategy 2007-2012.*

[223] London Borough of Camden (2008), *Shaping Camden: Core Strategy: Preferred Approach*, p. 89

[224] Members of the Fire Authority are appointed by the Mayor of London. Eight are nominated from the London Assembly, seven are nominated from the London boroughs and two are Mayoral appointees. http://www.london-fire.gov.uk/AboutUs.asp, accessed 08/04/2009.

Table 10-1: Fire Stations in Camden, 2007

Fire Station	*Station Ground (km sq)*
Belsize	5.4 km sq
Euston	5.2 km sq
Kentish Town	7.0 km sq
West Hampstead	11.8 km sq

Source: Camden Borough Profile, London Fire Brigade, 2007

Table 10-2 shows that overall Euston station responded to the highest number of operational incidents in 2006/07. Interestingly, the false alarm operation incidents constituted the largest proportion of all operational incidents responded to. Consultation however revealed that as the operational ground of each London fire station extends beyond borough boundaries, no the stations are not considered to be strained by current levels of demand[225].

Table 10-2: Operational Incidents 2006/07 in London Borough of Camden

	Operational Incident (2006/07)				
Fire Station	*All Fires*	*False Alarms*	*Road Traffic Collision*	*Other Special Service*	*Total*
Belsize	153	928	25	440	1,546
Euston	293	1,966	40	820	3,119
Kentish Town	328	855	34	567	1,784
West Hampstead	410	795	37	504	1,746

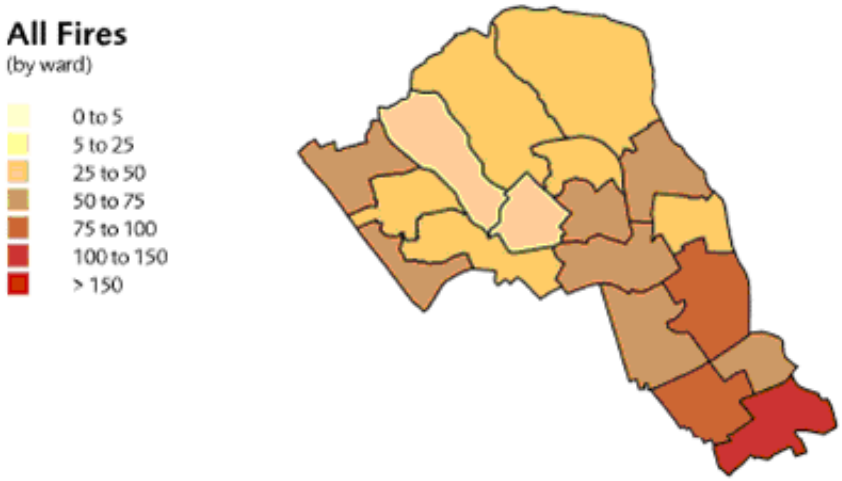
Source: Camden Borough Profile, London Fire Brigade, 2007

Fire Incidence Activity in Camden by Ward

Figure 10-1 and **Figure 10-2** below show a concentration of both fire and other special services by ward in Camden's south sub-area and the southern parts of the north east sub-area. These sub-areas only host two of Camden's four fire stations.

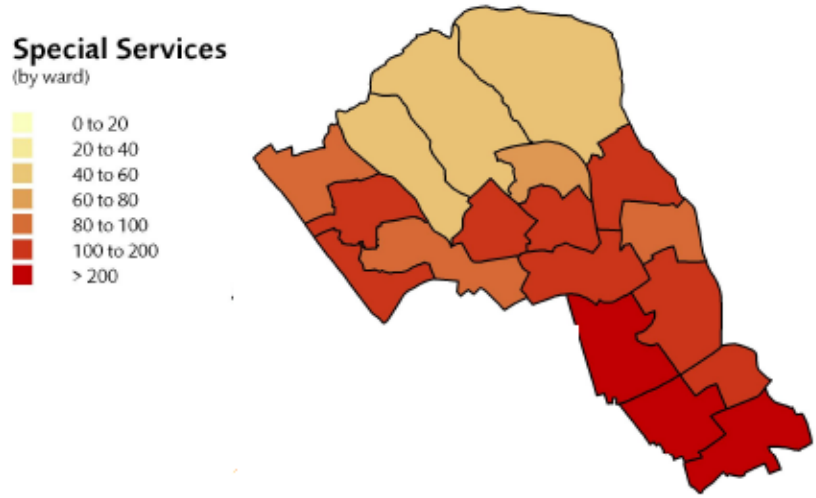
[225] London Fire and Emergency Planning Authority, Risk Information, 30/03/2009; London Fire Brigades, Borough Commander, 01/05/2009.

Figure 10-1: All Fire by Ward in Camden, 2007



Source: Camden Borough Profile, London Fire Brigade, 2007

Figure 10-2: Special Services by Ward in Camden, 2007



Source: Camden Borough Profile, London Fire Brigade, 2007

It is noticeable that Camden's south sub-area and the southern parts of the north east sub-area appear to be subject to a high number of fire accidents and other emergency situations requiring fire brigades intervention. However, these sub-areas only host two of Camden's four fire stations, which are likely to be subject to additional demands arising from the sub-areas projected population and jobs growth up to 2026.

Planned Investment

The London Fire Brigade do not currently have plans to restructure Camden's existing provision of fire stations meaning that the existing four stations are expected to remain in place[226]. However, there is a focus on rebuilding and refurbishing the existing ones[227].

Table 10-3 below shows the proposed initiatives for fire provision outlined in the *Asset Management Plan 2008* including a proposal for improvements at Kentish Town. The proposed improvements are part of a plan to update. The indicative costs shown in the table have been based on the average cost of recent refurbishment/replacement fire station, the new fire station safety standard, to meet changes in functional requirements for refurbishments[228].

Table 10-3: Proposed Initiatives in Camden and across London

Proposed/ Planned Initiative	*Project Description*	*Indicative Cost*
Kentish Town fire station at Camden	Improvements and alterations to its fire service	NA
30 stations (across London)	Updated all 30 which are 60 years old	£130m
22 stations (across London)	Second round of updating as move form satisfactory to poor.	£90m

Source: LFEPA capital programme 2008/09 & London Fire Brigades Asset Management Plan (2008)

Adequacy of Existing and Committed Provision

In terms of response times, at a borough level, Camden receives good attendance coverage with the first fire engine arriving on average in less than five minutes[229]. Consultation with Camden London Fire Brigades confirms that current levels of staff and existing facilities are considered adequate to meet existing demand[230].

[226] LB Camden, 2008, Shaping Camden, *Camden Core Strategy Preferred Approach*, Appendix 1

[227] The London Fire and Emergency Planning Authority website newly refurbished 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. There is currently work 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 fire fighters or the number of fire engines serving an area once a station is rebuilt.

[228] London Fire Brigade (2008), *Draft Asset Management Plan (Property)*.

[229] London Fire Planning Authority, Risk Information, 23/02/2009

[230] London Fire Brigades, Borough Commander, 01/05/2009.

The *Asset Management Plan 2008*[231] outlines that there are currently 30 fire stations throughout London which are pre 1940 and therefore need to be updated. 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[232].

It is difficult to access the adequacy (in quantifiable terms) of current or future fire station provision in the LB Camden level because fire stations and fire engines work across borough boundaries, particularly in large scale emergency situations[233]. There are no committed plans to expand Camden's fire services provision, apart from improvements and alterations to the Kentish Town station.

However, overall the current provision of fire staff and facilities in Camden is described as adequate to meet current demand[234].

10.3. Estimating Future Demand

Policy Guidance

The *London Fire Safety Plan*[235] introduced new targets to measure the performance of London Fire crews in getting to emergency incidents. The Fire Brigade measures the percentage of occasions when first and second fire engines arrive at emergency incidents within set time thresholds, the first fire engine to reach an incident in five minutes on 65% of occasions and within eight minutes on 90% of occasions. These targets apply London-wide and all boroughs are performing well to reach them[236]. The London Fire Brigade are continuing to identify new ways to reach incidents more efficiently[237], which suggests future demand is being considered.

Quantitative forecasts for future fire management service requirements in Camden were not available. Consultation with the London Fire and Emergency Planning Authority indicated that estimated demand for fire services is based on the number of incidents that occur in a given borough[238]. Because fire provision is not directly related to population, it is not possible to arrive at a provision standard that can be easily used to model resulting infrastructure needs arising from growth.

---

[231] London Fire Brigade (2008), *Draft Asset Management Plan (Property)*.

[232] Ibid.

[233] London Fire Brigades, Borough Commander, 01/05/2009.

[234] London Fire Planning Authority, Risk Information, 20/03/2009

[235] London Fire Brigade (2008), *London Fire Safety Plan*, London Fire and Emergency Authority.

[236] London Fire Brigade (2008), *Our Performance 2007/08*

[237] Ibid.

[238] London Fire and Emergency Planning Authority, Risk Information, 18/12/2008

Future Trends

The key issues for the future are likely to improve fire safety in buildings. This is considered to be an issue for existing and particularly for ageing residential building stock. On the contrary offices are less prone to high fire risk, being subject to stricter health and safety regulations. As such, there has been a trend of relocating fire stations from inner to outer locations in the individual local authorities and in London as a whole, where ageing residential stock is concentrated[239].

New developments on the other hand are increasingly fire-safe. For this reason, commercial and residential developments in Camden do not necessarily translate in a growth in fire related risks, and in turn in the need for new staff and infrastructure[240].

10.4. Demand for Fire Management Infrastructure arising from Growth

Demand for fire management 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, and this has remained the average despite the increased population in London[241].

Although population is not used directly to assess demand, the London Fire Brigades and the LFEPA are involved in discussions at the early stages of the planning process when new developments and major regeneration projects are put forward. Each new development is assessed in terms of the time it takes for fire services to reach them and the adequacy of fire safety measures; occasionally the scale of the scheme will require an assessment of the adequacy of available resources as was the case for the Olympics project.[242]. Whilst the increases in the number of commercial buildings generally raise the number of false alarms, this is not perceived to be an issue in Camden (see **Section 10.3**, Future Trends).

10.5. Resulting Fire Management Infrastructure Requirements

As mentioned previously, Camden's Core Strategy key infrastructure projects and plans outline that the London Fire Brigade do not foresee any restructuring of Camden's existing fire provision due to population growth. Consultation with the London Fire Brigades has confirmed that the Integrated Risk Management Assessment team within the LFEPA have considered the projected population growth and identified no need for additional infrastructure to meet the Camden's future demand[243].

---

[239] London Fire Brigades, Borough Commander, 01/05/2009.

[240] Ibid.

[241] Ibid.

[242] Ibid.

[243] London Fire Brigades, Borough Commander, 2009.

10.6. Funding

Funding for additional fire infrastructure provision is set out in an annual budget agreed by the LFEPA and the Mayor of London. Major works are funded by a mix of this mainstream source and private finance initiatives (PFI) [244].

[244] Ibid.

10.7. Summary and Recommendations

Summary of Infrastructure Requirements Assessment

All emergency services are planned for at the London level, with an additional local day-to-day management and operational layer. All emergency services providers are part of Camden's Community Safety Partnership, to the purpose of which is to facilitate a joined-up approach in addressing the borough's safety issues.

There is a considerable information gap on planned investment and adequacy of provision at the Camden level. What has been able to be compiled is shown in **Table 10-4**. Also, estimates of future demand for emergency services are unavailable, both at the London and Camden levels.

Finally, planning for future provision is driven mainly by specific statistics and a case-by-case consideration of major forthcoming development. Coupled with lack of adequate information this has meant that URS was unable to model both additional demand stemming from Camden's projected growth and the associated spatial requirements and costs.

Table 10-4: Summary of Known Infrastructure Requirements

Infrastructure Item	*Where & Area*	*When (Trigger Point or Period)*	*Who to provide?*	*Funding Source*
Delivery of new police control/IT room and public help desk	King's Cross	2007-2017	Metropolitan Police Authority	Metropolitan Police Authority
Delivery of police shop fronts	Camden Town	2007-2017	Metropolitan Police Authority	Metropolitan Police Authority
Modernisation and consolidation of estate and relocation of facilities if required	Camden Town	2007-2017	Metropolitan Police Authority	Metropolitan Police Authority

Source: London Borough of Camden (2008), Shaping Camden: Core Strategy Preferred Approach; London Fire Brigades Asset Management Plan (2008), London Fire Brigades, Borough Commander, 01/05/2009; London Ambulance Service, Camden Ambulance Operations, 01/05/2009; London Borough of Camden, Community Safety, 30/04/2009; Metropolitan Police, Camden Borough Police, 06/05/2009.

Recommendations

In light of the fact that it has not been possible to conclude specific infrastructure requirements arising from the projected residential and commercial growth in Camden, it

is suggested that the following actions are pursued to adequately plan for infrastructure in support of the spatial development plans illustrated in *Camden's Core Strategy Preferred Approach*:

- Recommendation #1: Camden Council should continuously engage with the Metropolitan Police, London Ambulance Service NHS Trust and London Fire and Emergency Planning Authority to ensure that the potential impact of projected growth in the borough and is adequately considered by service providers when developing their asset management plans and estate strategies.

- Recommendation #2: The Council should promote active engagement between emergency services providers so that the respective plans are considered when planning for future provision.

- Recommendation #3: The Council should promote active engagement between the Camden PCT and the London Ambulance Service NHS Trust to ensure that any opportunity for the co-location of primary, secondary and ambulance services are considered when estates strategies are developed.

PART E – FINAL CONCLUSIONS

11. CONCLUSIONS – IDENTIFYING GAPS AND INDICATING RELATIVE INFRASTRUCTURE IMPORTANCE

11.1. Summary of Infrastructure Requirements and Recommendations to 2026

The infrastructure needs assessments carried out in the preceding chapters have arrived at a series of infrastructure recommendations for general utilities, foul and surface water drainage, waste management and emergency services infrastructure. The identified requirements will be important to meeting the vision of Camden's Community Strategy that Camden will be a borough of opportunity.

Table 11-1 and **Figure 11-1** below summarise the infrastructure requirements for each type of infrastructure covered by this report required to support the growth in population that is set out to occur in accordance with the spatial vision set out in the Core Strategy.

Please note that a grey background has been used to indicate those types of infrastructure where Camden Council or other providers had already completed comprehensive work to look at infrastructure needs, and where the infrastructure requirement specified is a result of their work rather than a result of work completed by URS for this commission.

In **Table 11-1** the recommended level of importance ascribed to each infrastructure scheme (1-2) sets out for the Council how critical URS consider the infrastructure item or the action to be to ensure delivery of development in Camden (including that which rectifies current infrastructure deficiencies). Items labelled as '1' are regarded as critically important or definitely required over the plan period. Items labelled as '2' are significant and highly desirable but are not critical. It is stressed that the indications of relative importance given in the table are the view of the consultant and do not necessarily represent the view of or importance attributed to those requirements by London Borough of Camden.

Further explanation of the detail contained in each of the columns is presented in the *Camden Infrastructure and CIL Study, Preparing for Growth: Executive Summary and Strategic Infrastructure Plan*, which accompanies this report.

Table 11-1: Summary of Infrastructure Requirements

Key

	Already identified by responsible agency/ provider
	Requirement identified via this study

Infrastructure Area	*Infrastructure Schemes and Actions*	*Infrastructure Importance (1-2)*	*Rationale for Inclusion / Risk if not Included*	*Drivers*			*Phasing*	*Location*	*Responsibility and Funding*			*Costs*		*Current Delivery Arrangements*			*Notes*
				Policy	Existing gap/ replacement/ upgrade	Forecast demand for development	When should the infrastructure items be delivered by?	Where should the infrastructure item be delivered?	Responsible Delivery Agency	Responsible Funding Agency	Role and responsibility of LBC as the LPA	Identified by providers incl. status	Identified by URS / HUDU model	Is the need noted by the provider?	Is the need planned for?	Is funding in place?	
Water	Provision of additional 9,931,350 l/day and related local and strategic infrastructure.	1	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 no clear, immediate plan for the Camden area evident.		✓	✓	M – L	Borough wide and outside the borough boundaries	Regulator / Utility provider	Utility provider	Lobbying, / stakeholder consultation / assist with planning	Not available	Not availabl e	Y	Not known	Not known	TW already planned for a new desalination plant at Beckton and new reservoir in Oxfordshire. Based on the limited information available, additional required infrastructure is expected to include upgraded or renovated pumping stations and mains.
Electricity, Gas, Telecoms	LBC to lobby utility providers and regulatory bodies to devise a strategic longer term planning approach to provision of required utilities.	1	Existing strategies of utilities companies are for short-term reactive works only. These works will not ensure the new demand for utilities stemming from additional growth is met.			✓	S – M – L	Borough wide	Regulator / Utility provider	Utility provider	Lobbying, / stakeholder consultation / assist with planning	Not available	Not availabl e	N	Not known	Not known	

Infrastructure Area	*Infrastructure Schemes and Actions*	*Infrastructure Importance (1-2)*	*Rationale for Inclusion / Risk if not Included*	*Drivers*			*Phasing*	*Location*	*Responsibility and Funding*			*Costs*		*Current Delivery Arrangements*			*Notes*
				Policy	Existing gap/ replacement/ upgrade	Forecast demand for development	When should the infrastructure items be delivered by?	Where should the infrastructure item be delivered?	Responsible Delivery Agency	Responsible Funding Agency	Role and responsibility of LBC as the LPA	Identified by providers incl. status	Identified by URS / HUDU model	Is the need noted by the provider?	Is the need planned for?	Is funding in place?	
Electricity	Provision of additional 77,152 KVA to 2026 and related local and strategic infrastructure.	1	Fundamental to the delivery of commercial and residential growth.			✓	S – M – L	Borough wide	Regulator / Utility provider	Utility provider	Lobbying, / stakeholder consultation / assist with planning	Not available	Not available	Not known	Not known	Not known	Based on the limited information available, additional required infrastructure is expected to include new primary and secondary substations.
Gas	Provision of additional 14,273 m3/hr and related local infrastructure.	2	Fundamental to the delivery of commercial and residential growth.			✓	S – M – L	Borough wide	Regulator / Utility provider	Utility provider	Lobbying, / stakeholder consultation / assist with planning	Not available	Not available	Y	Y	Not known	Based on the limited information available, additional required infrastructure is expected to be limited to extension in mains to the development and potential on-site works.
Sustainable Energy – Working Measures	Establishing programme to utilise organic and non-recyclable waste streams	2	Low carbon fuel and energy supply / Non delivery of sustainable energy infrastructure		✓		M	Borough wide with cross-boundary programme recommended	LPA / LDA	LDA / MUSCo	Land provision from currently owned stock	N/A	N/A	N	N	Not known	
	Identify scope for a biomass supply chain	2	Low carbon fuel and energy supply / Non delivery of sustainable energy infrastructure		✓		M	Borough wide with cross-boundary programme recommended	LPA / LDA	LDA / ESCo	–	N/A	N/A	N	N	Not known	

Infrastructure Area	*Infrastructure Schemes and Actions*	*Infrastructure Importance (1-2)*	*Rationale for Inclusion / Risk if not Included*	*Drivers*			*Phasing*	*Location*	*Responsibility and Funding*			*Costs*		*Current Delivery Arrangements*			*Notes*
				Policy	Existing gap/ replacement/ upgrade	Forecast demand for development	When should the infrastructure items be delivered by?	Where should the infrastructure item be delivered?	Responsible Delivery Agency	Responsible Funding Agency	Role and responsibility of LBC as the LPA	Identified by providers incl. status	Identified by URS / HUDU model	Is the need noted by the provider?	Is the need planned for?	Is funding in place?	
	Establishment of new partnership management arrangements between waste operators and energy suppliers	2	Low carbon fuel and energy supply / Non delivery of sustainable energy infrastructure		✓		M	Borough wide with cross-boundary programme recommended	LPA / LDA	LDA / MUSCo	Discuss and liaise with other LPA's falling within the NLWP to progress the development of a local low carbon fuel and energy supply	N/A	N/A	N	N	Not known	
	Development of sustainability policies demonstrating expectations for developers to utilise low carbon fuel sources and to connect to sustainable utilities, where feasible	1	Ensure financial viability of delivering sustainable energy infrastructure / Non delivery of sustainable energy infrastructure	✓	✓	✓	S	Borough wide	LPA	N/A	Implementation of policy	N/A	N/A	Y	Y	Not known	
Decentralised Energy Infrastructure	King's Cross Growth Area	2	Opportunity to implement decentralised energy infrastructure due to baseline and projected energy demand profile / Loss of opportunity to	✓	✓	✓	M	King's Cross GA with potential connection to Euston GA	LPA / LDA / PPP / PFI	LDA / ESCo (PFI or PPP)	Land provision from currently owned stock / Expectation on developers to connect	N/A	N/A	Y	Y	Not known	This is potentially partly addressed by s106 arrangements as part of the King's Cross Central development.

Infrastructure Area	*Infrastructure Schemes and Actions*	*Infrastructure Importance (1-2)*	*Rationale for Inclusion / Risk if not Included*	*Drivers*			*Phasing*	*Location*	*Responsibility and Funding*			*Costs*		*Current Delivery Arrangements*			*Notes*
				Policy	Existing gap/ replacement/ upgrade	Forecast demand for development	When should the infrastructure items be delivered by?	Where should the infrastructure item be delivered?	Responsible Delivery Agency	Responsible Funding Agency	Role and responsibility of LBC as the LPA	Identified by providers incl. status	Identified by URS / HUDU model	Is the need noted by the provider?	Is the need planned for?	Is funding in place?	
	Euston Road Growth Area	2	meet baseline and projected energy demand	✓	✓	✓	L	Euston GA with support from the King's Cross GA						Y	Y	Not known	This would build on existing LDA work on the feasibility for an area-wide CHP/district heating network for the Euston Road area. Also, CHP schemes already supply to UCL campuses in the area, Bloomsbury Heat ant Power and Gower Street Heat and Power, and there are a large number of communal heating schemes serving local authority housing estates to the north of Euston Road. Finally, the North East Quadrant development at Regents Place has had approval for CHP to provide energy to the site and to investigate the possibility of exporting heat to the rest of that estate and several Council housing buildings if feasible.

Infrastructure Area	*Infrastructure Schemes and Actions*	*Infrastructure Importance (1-2)*	*Rationale for Inclusion / Risk if not Included*	*Drivers*			*Phasing*	*Location*	*Responsibility and Funding*			*Costs*		*Current Delivery Arrangements*			*Notes*
				Policy	Existing gap/ replacement/ upgrade	Forecast demand for development	When should the infrastructure items be delivered by?	Where should the infrastructure item be delivered?	Responsible Delivery Agency	Responsible Funding Agency	Role and responsibility of LBC as the LPA	Identified by providers incl. status	Identified by URS / HUDU model	Is the need noted by the provider?	Is the need planned for?	Is funding in place?	
	Tottenham Court Road	2		✓	✓	✓	S	TCRd GA with potential connection to Euston GA						Y	Y	Not known	
	Holborn Growth Area	2		✓	✓	✓	S	Holborn GA						Y	Y	Not known	
	West Hampstead Interchange	2		✓	✓	✓	M-L	West Hampstead Interchange GA						Y	Y	Not known	It is also understood that the Council will encourage the delivery of a smaller network in the north of the borough, at Gospel Oak associated with estate regeneration or at Camden Town associated with a development at Hawley Wharf.
Sewerage - Sewers	New and renovated sewers	1	The sewerage system is currently operating at full capacity. The system will not be able to cope with additional forecast development. Investment is also required to reduce sewer flooding. This includes a requirement for increased cycles of cleaning and prompt repairs where blockages are known.		✓	✓	S – M - L	Improvements should be borough wide. Problem hotspots the north west sub-area	Thames Water (in association with the Regulator)	Thames Water	Lobbying, assist with planning, in-kind resources where possible, technical expertise. Collect planning gain contributions to fund improvements.	(To 2020) Costs identified are across the Thames Water Region at £4,376m	(To 2020) £74m	Y	Not known	Not known	Whilst Thames Water's five and 25 years plans show that a capital investment plan is in place to address the renovation or expansion of the sewers system in the whole of the Thames Water region, the extent to which specific plans related to Camden have been finalised and funding committed is not clear. This applies to both pumping stations and sewer

Infrastructure Area	*Infrastructure Schemes and Actions*	*Infrastructure Importance (1-2)*	*Rationale for Inclusion / Risk if not Included*	*Drivers*			*Phasing*	*Location*	*Responsibility and Funding*			*Costs*		*Current Delivery Arrangements*			*Notes*
				Policy	Existing gap/ replacement/ upgrade	Forecast demand for development	When should the infrastructure items be delivered by?	Where should the infrastructure item be delivered?	Responsible Delivery Agency	Responsible Funding Agency	Role and responsibility of LBC as the LPA	Identified by providers incl. status	Identified by URS / HUDU model	Is the need noted by the provider?	Is the need planned for?	Is funding in place?	
																	mains. Thames Water undertook improvements to sewers in West Hampstead (Holmdale Road, Pandora Road, Solent Road and Sumatra Road) that was completed in 2008. The Thames Tideway Tunnel when developed will help alleviate sewer flooding in the southern reach of the borough. The areas targeted include north of Euston Road, South Hampstead and Kentish Town, as well as parts of West Hampstead not already alleviated by the works completed in 2008.
Sewerage – Pumping Stations	New and refurbished pumping stations required	1	The sewerage system if currently operating at full capacity. The system will not be able to cope with additional forecast development.		✓	✓	S- M	Improvements should be borough wide.	Thames Water (in association with the Regulator)	Thames Water	Lobbying, assist with planning, in-kind resources where possible, technical expertise. Collect planning gain	(To 2020) Costs identified are across the Thames Water Region at £243m	(To 2020) £4m	Y	Not known	Not known	

Infrastructure Area	*Infrastructure Schemes and Actions*	*Infrastructure Importance (1-2)*	*Rationale for Inclusion / Risk if not Included*	*Drivers*			*Phasing*	*Location*	*Responsibility and Funding*			*Costs*		*Current Delivery Arrangements*			*Notes*
				Policy	Existing gap/ replacement/ upgrade	Forecast demand for development	When should the infrastructure items be delivered by?	Where should the infrastructure item be delivered?	Responsible Delivery Agency	Responsible Funding Agency	Role and responsibility of LBC as the LPA	Identified by providers incl. status	Identified by URS / HUDU model	Is the need noted by the provider?	Is the need planned for?	Is funding in place?	
											contributions to fund improvements.						
Surface and Foul Water Drainage (Drainage maintenance and surface renewal / upgrades)	Maintenance of highway drainage, particularly reparation of damaged gullies. Replace impermeable surfaces with permeable systems to reduce the quantity of surface water runoff and hence mitigate flooding.	1	Help reduce the risk of surface water flooding		✓	✓	S – M - L	Through-out the borough	LPA	LPA	Funding and commissioning the work	£3,1m		Y	Not known	Partly	Cost is estimated on the basis that the current budget of £200,000 only allows for the reparation of 6.4% of the non-running gullies
Flood Risk	Sewer flooding investigation	1	To ensure full understanding of the strategic impact of new development on the sewer system and therefore on the risk of sewer flooding		✓	✓	S – M - L	Throughout the borough, particularly in the north west and south sub-areas.	LPA in association with Thames Water (and potentially the adjoining boroughs)	LPA	Commissioning the study to Thames Water		£50,000 (indicative only)	Not known	Not known	Not known	
	Preparation of a Surface Water Management plan	1	Help the Council consider all potential sources of flood risk and identify remedial measures	✓		✓	S – M - L	Throughout the borough	LPA	LPA	Preparation and funding	Not available	Not available	Not known	Not known	Not known	

Infrastructure Area	*Infrastructure Schemes and Actions*	*Infrastructure Importance (1-2)*	*Rationale for Inclusion / Risk if not Included*	*Drivers*			*Phasing*	*Location*	*Responsibility and Funding*			*Costs*		*Current Delivery Arrangements*			*Notes*
				Policy	Existing gap/ replacement/ upgrade	Forecast demand for development	When should the infrastructure items be delivered by?	Where should the infrastructure item be delivered?	Responsible Delivery Agency	Responsible Funding Agency	Role and responsibility of LBC as the LPA	Identified by providers incl. status	Identified by URS / HUDU model	Is the need noted by the provider?	Is the need planned for?	Is funding in place?	
	Preparation of emergency management plans and associated inundation mapping for the reservoirs at Hampstead Heath	2	Help understand the flood risk deriving from the reservoirs and identify mitigation/remedial measures	✓	✓	✓	S – M - L	North west and north east sub-areas	Corporation of London	Corporation of London	Fully liaising with London Corporation throughout the process of creating these plans.	Not available	Not available	Not known	Not known	Not known	The emerging *Flood and Water Management Bill*, once published, will provide details on whose responsibility it will be to prepare inundation maps for large and small reservoirs.
	Analysis of flood risk derived by Regents Canal to the surrounding areas	2	Help understand the flood risk deriving from the Canal and identify mitigation/remedial measures		✓	✓	S – M - L	Southern edge of north west and north east sub-areas, and northern edge of south sub-area	British Waterways in coordination with LPA	British Waterways	Assist British Waterways to undertake the study	Not available	Not available	Not known	Not known	Not known	
Foul and Surface Water Drainage (Flood risk related SUDS measures)	Implementation of Sustainable Urban Drainage Systems (SUDS) and promotion of flood resistant architecture	2	Help alleviate sewer flowing	✓		✓	S – M - L	Improvements should be borough wide.	LPA	LPA (if it is the landowner) / Developer applicant	Implement through Development Control policies / Funding if it is the landowner	Not available	Not available	Y	Not known	Not known	

Infrastructure Area	*Infrastructure Schemes and Actions*	*Infrastructure Importance (1-2)*	*Rationale for Inclusion / Risk if not Included*	*Drivers*			*Phasing*	*Location*	*Responsibility and Funding*			*Costs*		*Current Delivery Arrangements*			*Notes*
				Policy	Existing gap/ replacement/ upgrade	Forecast demand for development	When should the infrastructure items be delivered by?	Where should the infrastructure item be delivered?	Responsible Delivery Agency	Responsible Funding Agency	Role and responsibility of LBC as the LPA	Identified by providers incl. status	Identified by URS / HUDU model	Is the need noted by the provider?	Is the need planned for?	Is funding in place?	
Waste	Use of additional waste management facilities and land	2	Need to accommodate future waste needs	✓	✓	✓	M-L	Ideally within Camden, but due to spatial constraints - outside the borough, either in north London or outside London	NLWA	LBC, via NLWA apportionment together with other north London boroughs & funding request for PFI credits together with other funding options to be explored by LBC	Supply of relevant technical information to NLWA and contributing to the preparation of the North London Waste Plan together with the other six North London boroughs.	Not available	Not availabl e	Y	N	Not known	The North London Waste Plan Preferred Options Report will be published in October 2009 and will identify suitable additional sites for managing North London's additional waste.
	Inclusion of integrated waste management facilities within new developments	2	Need to accommodate future waste needs	✓	✓	✓	S-M-L	Within the London Borough of Camden	Private companies e.g. developer of a housing estate	Private company e.g. developer of a housing estate	LBC may require the inclusion of waste management facilities as part of planning conditions	Not available	Not availabl e	Not known	Not known	Not known	The provider would be a private company e.g. a developer

Infrastructure Area	*Infrastructure Schemes and Actions*	*Infrastructure Importance (1-2)*	*Rationale for Inclusion / Risk if not Included*	*Drivers*			*Phasing*	*Location*	*Responsibility and Funding*			*Costs*		*Current Delivery Arrangements*			*Notes*
				Policy	Existing gap/ replacement/ upgrade	Forecast demand for development	When should the infrastructure items be delivered by?	Where should the infrastructure item be delivered?	Responsible Delivery Agency	Responsible Funding Agency	Role and responsibility of LBC as the LPA	Identified by providers incl. status	Identified by URS / HUDU model	Is the need noted by the provider?	Is the need planned for?	Is funding in place?	
Police	Delivery of new police control/IT room and public help desk	2	Address the safety and security needs of the King's Cross Central area.		✓	✓	S-M	King's Cross	Metropolitan Police	Developer	Securing s109 funding	Not available	Not availabl e	Y	Y	Y	Provision of not less than 150 sqm NIA facility. The scheme is part of the King's Cross Central development.
	Delivery of police shop fronts	2	Deliver the police 'citizen focused' approach, by locating small front office type facilities in accessible locations, including shopping frontages and main community facilities as appropriate.		✓	✓	S-M-L	Borough wide	Metropolitan Police	Metropolitan Police / Developer	Develop enabling land use planning policy			Y	Not known	N	
	Modernisation and consolidation of estate and relocation of facilities if required	2	Enable the delivery of the MET estate strategy, whose objectives include achieving optimum service delivery by ensuring processes and functions sit more closely together.		✓	✓	M-L	Borough wide	Metropolitan Police	Metropolitan Police (capital receipts)	Assist the MET in implementing estate strategy	Not available	Not availabl e	Y	Not known	N	Whilst the current economic climate may be an impediment to redevelopment in the short term, the strategy would still be pursued in the medium to long term. The modernisation and consolidation of the estate would include the delivery of: New Safer Neighbourhood Bases New Custody Centre/Patrol Base.

Source: URS / ISU analysis

Figure 11-1: Summary of Strategic Utilities and Physical Infrastructure Requirements

Summary Strategic Utilities and Physical Infrastructure Requirements

SUB AREA A - SOUTH

Infrastructure	Demand	Action	Requirement
	7.5 M l/d		
	65, 114 kVA 9,161 m3/s		CHP GA-1, GA-2, GA-3, GA-4
	11.2 M l/d		
			New police office in GA-1 King's Cross (in the pipeline)
		DDD	Sewer flooding investigation

SUB AREA B - NORTH EAST

Infrastructure	Demand	Action	Requirement
	1.3 M l/d		
	6,750 kVA 2,823 m3/s		
	1.7 M l/d		
		DDD	Sewer flooding investigation Hampstead Heath reservoirs: emergency plans and inundation mapping Regents Canal: Analysis of flood risk

SUB AREA C - NORTH WEST

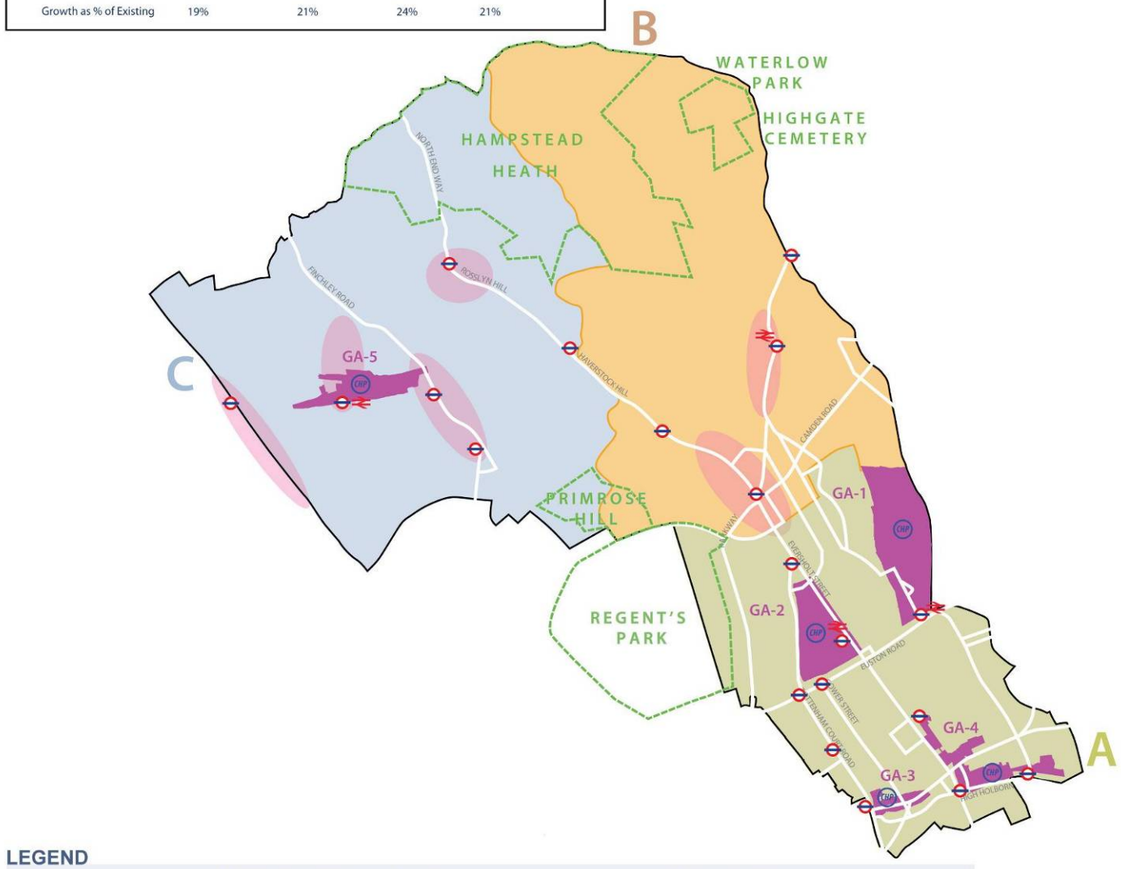
Infrastructure	Demand	Action	Requirement
	1.1 M l/d		
	5,719 kVA 2,325 m3/s		CHP GA-5
	1.5 M l/d		
		DDD	Sewer flooding investigation Hampstead Heath reservoirs: emergency plans and inundation mapping Regents Canal: Analysis of flood risk

BOROUGH WIDE

Infrastructure	Action	Requirement
		Lobbying utility providers and regulatory bodies to devise strategic longer term planning approach to provision
		Programme to utilise organic and non-recyclable waste streams New partnership management arrangements between waste operators and energy suppliers
		Sustainability policies to encourage developers to utilise low carbon fuel sources and to connect to sustainable utilities
	DDD	CHP Identify scope for a biomass supply chain
	DDD	Sewer flooding investigation Preparation of a Surface Water Management Plan
		Maintenance of highway drainage, with replacement of impermeable surfaces with permeable systems.
		Implementation of SUDS and promotion of flood resistant architecture
		Use of additional waste management facilities and land Integrated waste management facilities in new developments
		Delivery of police shop fronts Modernisation and consolidation of estate

BOROUGH WIDE UTILITIES DEMAND (DOMESTIC AND COMMERCIAL)

	Water, M L/day	Electricity, kVA	Gas, m3/s	Sewage, M L/day
Growth	9.9	77,152	14,273	14.3
Existing	52.7	362,590	58,313	67.1
Growth as % of Existing	19%	21%	24%	21%



LEGEND

Map
- LU Stations
- Main Line Stations
- A-roads (FINCHLEY ROAD)
- Town Centres
- Green Spaces
- Growth Areas

GA-1 King's Cross
GA-2 Euston
GA-3 TC Court Rd
GA-4 Holborn
GA-5 West Hampstead

Infrastructure type
- Water
- Energy
- Sewage
- Flood risk
- Waste
- Police

Action
- Further engagement or partnership working requirement
- Further detailed analysis required
- Infrastructure scheme or works required

Requirement
- CHP Combined Heat and Power
- Main / Pipe / Cable infrastructure network
- Primary substation
- Secondary substation
- Pumping station

Source: URS Corporation