steer davies gleave

Upper Lee Valley Development Infrastructure Funding Study (DIFS) – Phase 2

Published Report

August 2016

Greater London Authority

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1 Executive Summary

Objectives

1.1 In September 2015 Phase 1 of the Development Infrastructure Funding Study (DIFS) was published, identifying the 'gap' between the cost of infrastructure required within and serving the Upper Lee Valley (ULV) and the funding currently secured to deliver that infrastructure. The study was commissioned by Transport for London (TfL) and the Greater London Authority (GLA) to ascertain what may be needed to support the required level of growth within the Opportunity Area.

1.2 The DIFS Phase 1 report outlined the infrastructure requirements for transport and social infrastructure for a base scenario (no major transport improvements) and two higher growth scenarios (4-tracking the West Anglia Main Line and Crossrail 2). This study builds on the Phase 1 DIFS to provide additional information on utility requirements within these three growth scenarios.

Methodology

1.3 DIFS Phase 1 identified all known development sites and estimated the development on each site under the baseline and two higher growth scenarios. Within this study, meetings were held with each of the four boroughs to obtain updates to the predicted growth and any assumptions to be included, such as level of affordable housing provision.

1.4 Having undertaken a review of all of the existing utility policies for Gas, Electricity, Water, Flood Risk, Broadband and Decentralised Heat Networks, the information on the development expected within the ULV was shared with the utility companies. This was used to ascertain whether any additional investment would be required by them to support such growth. In addition, any challenges providing it were recorded, along with the potential funding sources.

1.5 The results of this investigation are shared within this report. The DIFS Phase 2 report has been developed between January and May 2016.

Headline Findings

Water

Potable

1.6 Water in London is scarce due to low levels of rainfall coupled with high demand and the higher growth within the ULV will increase demand further. All development scenarios will require additional water supply infrastructure, but the extent of this is not yet known as requires detailed modelling by Thames Water. The Crossrail 2 growth scenario generates the highest requirements.

Waste water drainage / sewage

1.7 Most of ULV has separate waste water and surface water pipes, however LB Hackney has a combined foul and surface water network. Reducing the amount of surface water entering a combined network can help free up the capacity in the network for foul flows from growth. Thames Water predicts that some areas of the Upper Lee Valley would not have sufficient sewerage capacity to manage the expected flows, leading to an increasing risk of sewer flooding without sewer infrastructure upgrades and / or sustainable drainage measures. LB Hackney and LB Enfield are particularly prone to this pressure. Beckton sewage treatment works has been recently upgraded and Deepham's are currently being upgraded, but both may require further minor upgrades after 2012 and 2026 respectively with the higher growth scenarios.

Flood Risk Management

1.8 The ULV includes significant areas at risk from both river and surface water flooding.

1.9 The Environment Agency currently provides a reactive model, however a pilot 'predict and provide' study in the ULV is underway. The current approach is hampering the Boroughs ability to plan surface water management strategies.

1.10 Site specific responses to flood risk will arise through the planning process.

Broadband

1.11 Broadband speeds within the ULV are variable with higher Superfast broadband capacity coverage than the UK average, but lower Ultrafast capability, which boroughs perceive as a constraint to development.

1.12 The infrastructure provision set up results in suppliers installing reactively rather than proactively.

1.13 The current hierarchy of providers results in a monopoly and in many cases limited or no choice for consumers but reduces costs for developers. Planning policy could reduce this monopoly by ensuring an open network in developments and enabling increased competition in the market.

1.14 Supplier's innovation means there is no constraint on supply across each of the three growth scenarios.

Energy and Waste

Gas

1.15 Part of some development sites are within the exclusion zones of high and medium pressure gas mains. The Meridian Water development requires the diversion of medium pressure gas pipes.

1.16 Recent gas network upgrades by National Grid have provided sufficient high and medium pressure for forecast development, including the higher growth scenarios.

1.17 Requirements for low pressure supplies are dependent upon the development type, scale and quantum; however National Grid does not foresee problems meeting any of the growth scenarios.

Electricity

1.18 The high voltage network has sufficient capacity to accommodate further development in the south of ULV. In the north, schemes have been identified to address the issues which will be triggered by development.

1.19 The higher growth scenarios will require upgrades of six substations to provide sufficient low voltage capacity.

1.20 In addition, implementation of Crossrail 2 and upgrades at Deepham's sewage treatment works would both trigger an upgrade and reinforcement of supplies due to their increased energy requirements.

Energy from waste

1.21 There are no landfill sites in north London and all waste disposed to landfill is currently exported out of the area. North London Waste Authority (NLWA) expect a capacity gap for residual landfill facilities up until 2017, beyond which they expect to divert all biodegradable or recyclable residual Local Authority Collected Waste (LACW) from landfill.

1.22 Recent upgrades have provided additional capacity, however there is still a capacity constraint for future growth. This will be addressed through the proposed new Energy from Waste facility at Edmonton EcoPark, currently part way through the Development Consent Order process. If this is granted consent, the need for major additional resource recovery facilities in ULV is unlikely, unless the area is to become a net importer of untreated waste.

1.23 All new properties will need to make provision for storage and collection of four streams of waste. This may have some impact, albeit small, on scheme design and viability.

Table 1.1: Headline summary

Utility	Headlines
Water - Potable	• The higher growth scenarios will require additional water supply infrastructure, but Thames Water need to undertake further modelling to determine the full extent of the shortfall. However it is clear that new mains distribution will be required within development sites to the west of the reservoirs and canal under the Crossrail 2 growth scenario. • Thames Water are considering a wastewater reuse plant at Deepham's Sewage Treatment Works. Other possible solutions include expanded reservoir storage, water transfer from other regions, reductions in supplies to other water companies, and site specific water use reduction measures.
Water – Waste	• Most of ULV has separate waste water and surface water pipes, however LB Hackney has a combined foul and surface water network. Reducing the amount of surface water entering a combined network can help free up the capacity in the network for foul flows from growth. Thames Water is trialling the replacement of combined sewers with separate surface and wastewater systems, which if positive will reduce flood risk in LB Hackney. • Thames Water needs to undertake further modelling to confirm further investment to increase sewer capacity. • Water reuse is an opportunity and should be encouraged at the construction and operational stages of new development.
Water – Surface / Flood Risk	• The ULV includes significant areas at risk from both river and surface water flooding. • The Environment Agency is undertaking two flood alleviation schemes in the next 5 years at Dagenham Brook and Moselle Brook, and Boroughs have a number of smaller schemes planned. • The EAs existing flood modelling data is out of date and will be replaced by a 'predict and provide' model, which is being piloted for the ULV; however this will not be available until 2017. This is hampering Boroughs' ability to plan surface water management strategies. • Site specific responses to flood risk will arise through the planning process.
Gas	• High / medium pressure gas valves and their exclusions zones are within close proximity of a handful of development sites in the three scenarios, however diversions for some are already underway to e.g. Meridian Water to maximise the developable area • Recent gas network upgrades by National Grid have provided sufficient high and medium pressure for forecast development including the higher growth scenarios • Requirements for low pressure supplies are dependent upon the development type, scale and quantum; however National Grid do not foresee problems meeting any of the growth scenarios • Low pressure mains upgrades are not complex and therefore it is not thought to be a limit on any of the development scenarios at this time
Electricity	• UKPN have confirmed there is currently sufficient capacity in the high voltage transmission system in the southern ULV to accommodate the anticipated growth for all scenarios, due to recent upgrades • In the north of ULV, future upgrades have been identified to the high voltage system, but the schemes are on hold until the demand is likely to be triggered. For lower voltage systems too, there is insufficient capacity for the Crossrail 2 scenario, for which UKPN have identified upgrades
Waste	• Energy from waste represents a good opportunity for future energy generation, however it will also reduce the constraints on landfill. • At present additional capacity is required for Commercial and Industrial Waste. • Recent upgrades at powerday in Brimsdown have helped increase capacity for Local Authority Collected Waste, but there is a need for the larger more efficient replacement waste treatment facility at Edmonton EcoPark, currently progressing through Development Consent Order to provide capacity for all growth scenarios.
Broadband	• Broadband speeds within the ULV are variable, with higher Superfast Broadband capacity coverage than the UK average, but lower Ultrafast capability • Boroughs perceive a problem due to lack of Ultrafast capacity • Networks are generally developed by providers through capital expenditure where there is a critical mass of end users, with costs recouped through consumer revenue. Therefore higher growth scenarios should help to improve provision due to increased number of end users • Competitive nature of network "layers" results in suppliers installing infrastructure when known rather than in anticipation of development • Current hierarchy of providers results in a monopoly and in many cases limited or no choice for consumers but reduces costs for developers • Planning policy could reduce this monopoly by ensuring an open network in developments and enable increased competition in the market • Suppliers are developing innovative solutions to provide broadband and therefore should not pose a limit on the higher growth development scenarios • Works to install broadband network should be managed by the highway authority to coordinate with other utilities to minimise disruption for the highway network

2 Introduction

Background of Development Infrastructure Funding Study (DIFS) Phase 1

2.1 The Upper Lee Valley (ULV) Opportunity Area (OA) is one of the largest OAs in London, covering 3,884 hectares. In July 2013 the ULV Opportunity Area Planning Framework (OAPF) was adopted by the Mayor of London. It sets out eight objectives for the area, including the delivery of 20,100 new homes and 15,000 new jobs by 2031. A number of growth areas were identified in the OAPF where this development is expected to be focused, including Blackhorse Lane, Tottenham Hale, North Tottenham /Tottenham Hotspur Stadium Redevelopment, Meridian Water, Edmonton Green, Ponders End and the A10/A1010 corridor. A location plan of the key growth areas is shown in Figure 2.1.

2.2 Following adoption of the OAPF, Transport for London (TfL) and the Greater London Authority (GLA) commissioned a DIFS to determine the transport and community infrastructure required to support the planned development in the ULV and identify how this could be funded. The DIFS specifically identifies the 'gap' between the cost of infrastructure required within and serving the ULV and the funding currently secured to deliver that infrastructure.

2.3 DIFS Phase 1 was completed in September 2015 through joint working between TfL, GLA, the four boroughs covering ULV (LB Enfield, LB Hackney, LB Haringey and LB Waltham Forest), Steer Davies Gleave, Price Waterhouse Coopers (PwC), Carter Jonas and SQW. The Phase 1 DIFS identified:

- the types of required infrastructure to deliver the proposed quantum of development;
- the phasing programme for infrastructure delivery; and
- potential sources and phasing of funding to deliver the required infrastructure.

2.4 The DIFS Phase 1 report is uploaded to the GLA website: **https://www.london.gov.uk/what-we-do/planning/implementing-london-plan/opportunity-areas/opportunity-areas/upper-lee-valley**.

2.5 A list of acronyms used within the report is provided in **Appendix A**.

Upper Lee Valley DIFS

Figure 2.1: Growth Areas

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Created by:	Last Updated:	Scale:
ORussell	08/09/2015	20,905

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Scope of DIFS Phase 2

2.6 This report relates to the second phase of the DIFS which builds on the previous work undertaken, but examines utility infrastructure in greater detail. This covers the following sectors:

- Water and Flood Risk Management (Waste water, potable water and flood risk management);
- Energy and Waste (electricity, gas and decentralised energy); and
- Broadband.

2.7 The previous report provided headline information on utility infrastructure, whereas this report provides further information and also associated costs for such infrastructure required to support the development proposals. More information has been made available by the utility companies for this part of the study due to the following reasons:

- the four boroughs have further developed their planning policy since the first phase of the study, which identifies site allocations and the expected approximate quantum of new development by land use. This greater detail of type of development expected at particular locations is critical to planning infrastructure networks; and
- the boroughs have updated their Infrastructure Delivery Plans (IDPs) / Surface Water Management Plans (SWMPs) / Waste Management Plans which all influence utility companies' strategic plans for the ULV.

2.8 The results presented in this report therefore act as an addendum to the Phase 1 DIFS completed in September 2015. Where relevant, information from the DIFS Phase 1 report has been included within this document.

2.9 As with the DIFS Phase 1, DIFS Phase 2 aims to identify the utility infrastructure requirements and their associated costs under three growth scenarios:

- Baseline – current allocations and permissions;
- Four-tracking of the West Anglia Main Line – upgrades to the current double-track rail arrangement through the ULV to four-track to allow fast trains to bypass stopping rail services; and
- Crossrail 2 – provides a new rail link from north-east to south-west London, with new stations in ULV. Although currently at feasibility stage, it has recent received a recommendation for funding support from the National Infrastructure Commission.

2.10 Each scenario takes account of the expected growth both within the identified development sites and the wider ULV.

3 Methodology and Programme

3.1 This section outlines how the information for the second phase of the DIFS has been collected and analysed. Meetings were held initially with each of the four boroughs and then with the relevant utility companies.

Meetings schedule and findings

Borough Meetings (January 2016)

3.2 Separate early meetings were held between Steer Davies Gleave and planning, housing, environment and/or regeneration officers from each of the four boroughs. The purpose of these meetings was to:

- summarise the findings from Phase 1, for those borough officers who had not attended the borough briefing on the DIFS study held in June 2014;
- update information on each development site, to reflect changes that had occurred since completing the Phase 1 report in September 2015;
- confirm and agree the development assumptions (level, location, type and density) for each site under each growth scenario;
- agree the likely proportion of affordable housing units within new residential sites;
- obtain updates on planning policy, including housing, sustainability, waste / water management;
- identify the scale and type of planning obligations and financial contributions (under Section 106 and Section 274) for infrastructure agreed on permitted development sites; and
- obtain information and reports on utilities either commissioned by the boroughs or prepared by third parties in support of planning proposals.

3.3 The information on the development sites under each scenario was updated and agreed with the boroughs. The modifications to the development assumptions are set out in, Table 3.2, Table 3.3 and Table 3.4. The total growth is also summarised in Table 3.5 (a Phase 2 update of Table 2.1).

LB Enfield

3.4 For LB Enfield, no changes were made to the list of development sites, but the development assumptions were modified as shown in Table 3.1 following discussions with officers, as their planning has progressed since Phase 1.

Table 3.1: LB Enfield Development Assumptions

Topic	DIFS Phase 1 Assumption	DIFS Phase 2 Assumption
Affordable housing	29% of all units across all 3 development scenarios	Assumes 40% of all units across all 3 development scenarios. Exception of Meridian Water - 30% affordable housing for all scenarios
Unit size mix	No assumption made	Housing mix accords with *e Enfield Plan: Core Strategy (2010 – 2025)* Core Policy 5
Flats vs houses	No assumption made	Assumes 20% houses and 80% flats
Sustainability	No assumption made	All dwellings will be BREEAM (Building Research Establishment Environmental Assessment Methodology) or Code for Sustainable Homes (November 2010) Code 4 as standard
Density	107 units per hectare	Unchanged

3.5 Meridian Water is one of the key major mixed-use development sites within ULV. The borough considers that the improvement in Public Transport Accessibility Level (PTAL) under the Crossrail 2 scenario due to its location adjacent to the proposed Angel Road station could support an additional 5-7,000 units at Meridian Water, with 2,800 of these also being likely with four-tracking. LB Enfield has commissioned studies to ascertain the specific utility requirements for Meridian Water. Since the study was prepared and after we had completed our analyses, it was announced on 27 May 2016 that this had increased to 10,000 homes[1].

3.6 Both higher growth scenarios assume a change in use of some existing employment land to residential, however as some of the sites are designated Strategic Industrial Land (SIL), a review will be required with regard to both the London Plan and borough policy.

3.7 Key concerns of the Council include:

- loss of Strategic Industrial Land (SIL) and other key employment uses and displacement of existing businesses and the need to find suitable alternative premises / locations;
- anticipated level of growth can only be supported with high-speed broadband; and
- Environment Agency's (EA) flood risk data on for the Meridian Water site will be not available until May 2017 (further information in 4.62); therefore it is difficult to quantify the areas potentially affected by flood risk, and the impact on development areas and quantum.

[1] Meridian Water, http://meridianwater.co.uk/news/enfield-council-creates-thousands-homes-jobs/ accessed on 10 June 2016

LB Hackney

3.8 No changes were made to the list of development sites, but the development assumptions were modified as shown in Table 3.2.

Table 3.2: LB Hackney Development Assumptions

Topic	DIFS Phase 1 Assumption	DIFS Phase 2 Assumption
Affordable Housing	29% all units across all 3 development scenarios	50% of all units across all 3 development scenarios
Unit size mix	No assumption made	Housing mix accords with adopted *Development Management Local Plan (July 2013)* Proposed Policy DM22
Flats vs houses	No assumption made	Assumes 80% flats and 20% houses
Sustainability	No assumption made	All new residential development will meet the criteria set out in the Housing SPG (Supplementary Planning Guidance) (March 2016)
Density	107 units per hectare	120 units per hectare

3.9 The borough is currently updating their Infrastructure Delivery Plan (IDP) and the revised version will be available July / August 2016.

3.10 LB Hackney has a combined waste and surface water sewerage system throughout the borough including all of the borough that is within the ULV and DIFS Phase 2 study area. This restricts the amount of development that can be brought forward on many sites. The borough has an emerging policy that requires Sustainable Urban Drainage Systems (SUDS) for new schemes which would release public sewer capacity and thus allow increased density of development, and similarly, emerging policy that requires all new developments to provide a separate foul and surface water drainage network.

3.11 In view of the problems with the EA flood risk modelling, as set out in Para 4.61, LB Hackney have acquired a licence for borough level flood risk modelling to present SUDS information across the borough visually which will identify potential issues for certain sites. This will help inform mitigation policy and discussions with Thames Water.

3.12 Key concerns from LB Hackney include:

- the capacity of the combined sewer network in the borough is deemed inadequate, leading to inundation of the network and surface water flooding, thus reducing peak flow capacity. It is thought this is reduced further through maintenance being insufficient;
- the Council is yet to run modelling for SUDS; and
- different organisations (Thames Water and EA) are not using the same baseline flood risk data which makes it difficult to draw comparisons between the two sets of results.

LB Haringey

3.13 The only change made to the list of development sites was to update Tottenham Hotspur Stadium redevelopment (allocated site NT4 in Haringey policy) to reflect recent planning permission and changes to the residential and hotel elements.

3.14 Energy provision for the development proposes a scenario based approach, based upon the progress of the development of the North Tottenham District Energy Network (DEN). If this is not progressed by Enfield, the development will provide a single site-wide energy centre located in the residential plot (the NDP energy centre).

3.15 The development assumptions were modified as shown in Table 3.3.

Table 3.3: LB Haringey Development Assumptions

Topic	DIFS Phase 1 Assumption	DIFS Phase 2 Assumption
Affordable Housing	20% of total development across all 3 development scenarios	25% of total development across all 3 development scenarios
Unit mix	No assumption made	Change housing mix to reflect Appendix A of *Haringey's Housing Strategy 2015-2020*
Flats vs houses	No assumption made	100% will be flats
Sustainability	No assumption made	All new residential development will meet the criteria set out in the *London Plan SPG (May 2015)*
Density	140	140

3.16 The review of LB Haringey's Community Infrastructure Levy (CIL) Charging Schedule (adopted July 2014) is being considered by the Council's Scrutiny Committee, but will not be completed within the DIFS Phase 2 timescales; however the borough stated the amended rates are unlikely to impact viability.

3.17 The Tottenham Hotspur Stadium Redevelopment includes the redevelopment of the football stadium, a new hotel, leisure and recreational facilities, residential land use and community health centre. The development will have a BREEAM 'Very Good' rating and use SUDS to minimise flood risk. Rainwater harvesting will be incorporated into the plans to reduce development's demand on the mains water supply.

3.18 Buro Happold Engineering investigated the capacity of local utility networks to support the Tottenham Hotspur Stadium Redevelopment planning application. Their report concludes that electricity supplies, potable water and broadband are likely to need reinforcing to support the development; however the existing gas supply has sufficient capacity. The utilities will be provided in stages for the new development to suit the phasing of construction.[2] Further detail on this is provided in the relevant utility chapters within this report.

3.19 Similarly, a utility study has been commissioned for the South Tottenham (Tottenham Hale) area by AECOM which is to focus on electricity, gas, water, drainage and telecommunications through completion of following actions:

- AECOM will review the utility record plans already obtained for the Tottenham Hale area and assess any diversionary requirements;
- contact the affected utility companies and request budget quotations for diverting their apparatus where required;
- assess the load requirements for the development based on the District Centre Framework masterplan;
- obtain budget quotations from the utility companies to provide new infrastructure to the development. This will include establishing any reinforcement requirements and lead in time for works;
- organise meetings with the utility companies where possible to discuss the scheme proposals and establish solutions to serving the proposed development areas;
- liaise with the utility companies in respect of the construction logistics and establish options available to suit the programme;
- contact Thames Water to discuss the drainage strategy for the development, including obtaining costs for any diversionary works and new connections; and

[2] Buro Happold Engineering, *Northumberland Development Project – Utilities Planning Report 031627,* 17 August, 2015, Revision 01

- based on the information received from the utility companies, prepare a report for LB Haringey detailing the findings.

3.20 The study was commissioned in April 2016, with the outcome expected later in 2016.

3.21 LB Haringey confirmed that there are no current plans to review their flood mitigation policy or infrastructure. They anticipate that each of the four boroughs will be updating their Infrastructure Delivery Plan (IDP) soon however in light of the higher growth set out in the ULV OAPF which was adopted in 2013, after boroughs had prepared their IDPs. For example, Haringey's most recent version of their IDP for the borough was prepared in March 2013.

3.22 Key concerns of LB Haringey include:

- lack of effective communication between TfL, developers, utility suppliers and local authorities, leading to duplication of effort;
- new water mains are required for 'island sites' at Tottenham Hale (SDG Site Ref 211); and
- energy networks are already at extreme capacity in North Tottenham area.

LB Waltham Forest

3.23 The change in development assumptions are shown in Table 3.4.

Table 3.4: LB Waltham Forest Development Assumptions

Topic	DIFS Phase 1 Assumption	DIFS Phase 2 Assumption
Affordable Housing	24% of total development across all 3 development scenarios	50% of total development across all 3 development scenarios
Unit mix	No assumption made	Change housing mix to reflect the *Local Plan Development Management Policies* Policy DM5
Flats vs houses	No assumption made	Sites within Blackhorse Lane will be 95% flats and 5% houses. All other development sites within borough will be 100% flats
Sustainability	No assumption made	All new residential sites will be Code 4 and should meet London Plan carbon reduction targets
Density	107	107

3.24 LB Waltham Forest recently consulted on their Housing Delivery Supplementary Planning Document (SPD) (consultation ended January 2016). This will clarify the Council's approach on viability which will provide a robust affordable housing target. They also intend to update their IDP as soon as possible but no specific date has been provided.

3.25 Key concerns include:

- new housing should be 'connection ready' for district heating network;
- issues communicating with utility companies (exception of Thames Water); and
- pressure for change of use and/or de-designation of SIL as part of the Crossrail 2 higher growth scenario.

3.26 The Council further identified that Thames Water's policy on the ten metre exclusion zone along the route of a water supply pipeline could significantly reduce the developable area surrounding Blackhorse Lane (near Blackhorse Road Station). This is a key regeneration site for the borough with the potential to provide 2,000 new homes and 1,000 new jobs[3].

[3] "Blackhorse Lane area regeneration", Waltham Forest, accessed 15 April, 2016, **https://www.walthamforest.gov.uk/pages/servicechild/blackhorse-lane-regeneration.aspx**

3.27 The Crossrail 2 scenario identifies additional development sites near Lea Bridge where there will be high development demand. There are no Crossrail 2 stations proposed within LB Waltham Forest, however the area has high accessibility to Tottenham Hale station which will provide an interchange onto Crossrail 2 service. It is expected that housing density will increase near Lea Bridge.

3.28 The Council is currently finalising the specification for a consultant to prepare the Leyton and Lea Bridge Masterplan, planning and regeneration delivery strategy. This work is estimated to take approximately six months.

Updated development sites

3.29 As a result of the conversations with each of the four boroughs, the overall level of development expected within each borough is summarised in Table 3.5. Baseline is expected to be to 2031 without rail infrastructure changes. Four -tracking this is expected in the mid 2020's and Crossrail 2 in early 2030's.

Table 3.5: Updated level of development within ULV

Borough	Growth scenario					
	Baseline		Four-tracking		Crossrail 2	
	Growth in housing units	Growth in jobs	Growth in housing units	Growth in jobs	Growth in housing units	Growth in jobs
LB Enfield	5616	2874	15199	5525	28849	5525
LB Hackney	6119	2725	6119	2725	6119	2725
LB Haringey	8391	5217	8921	7868	15857	7697
LB Waltham Forest	2254	1738	3326	1738	3406	1738
TOTAL	22380	12554	33565	17856	54231	17685

Follow-up from meeting with local authorities

3.30 Following the update of the development spreadsheets with the revised assumptions and development sites, the boroughs were asked to approve the information prior to it being issued to the utility companies. LB Haringey, LB Hackney and LB Waltham Forest provided this approval, no response was provided by LB Enfield.

Utility companies and organisations (January - March 2016)

3.31 Steer Davies Gleave held discussions with the following utility companies, categorised by sector as shown in Table 3.6.

Table 3.6: Organisations involved in ULV DIFS Phase 2

Company / Organisation	Water				Electricity	Gas	Decentralised energy	Telecommunications
	Potable	Wastewater	Surface water drainage	Flood Risk Management				
Thames Water	✓	✓	✓					
Boroughs			✓	✓			✓	
Environment Agency				✓				
National Grid					✓	✓		
UK Power Networks (UKPN)					✓			
Optimity								✓
Hyperoptic								✓
Sky								✓
Openreach (part of the BT Group)								✓
Virgin Media								✓
City Fibre								✓
ITS Technology Group								✓

3.32 The majority of the meeting attendees from utility companies were based in Strategy Planning, Sales, Public Affairs or New Developments teams. Some attendees were familiar with the study as had been involved in Phase 1 of the DIFS. The companies were provided with the following information by Steer Davies Gleave for internal use following the discussion:

- meeting agenda;
- link to the GLA website where ULV DIFS Phase 1 report is published;
- the updated development sites spreadsheet;
- map highlighting location of ULV OA within the London context; and
- location maps of development sites for baseline, four-tracking and Crossrail 2 scenario.

3.33 Most utility companies requested that the financial and cost information was treated as strictly confidential and should not be distributed.

3.34 The following sections of this report discuss strategic plans to meet the requirements of anticipated growth levels in ULV for each of the organisations.

4 Water and Flood Risk

Headlines

Potable Water

- The higher growth scenarios will require additional water supply infrastructure, but Thames Water need to undertake further modelling to determine the full extent of the shortfall. However it is clear that new mains distribution will be required within development sites to the west of the reservoirs and canal under the Crossrail 2 growth scenario.
- Thames Water are considering a wastewater reuse plant at Deepham's Sewage Treatment Works.
- Other possible solutions include expanded reservoir storage, water transfer from other regions, reductions in supplies to other water companies, and site specific water use reduction measures.

Waste water drainage/sewerage

- Most of ULV has separate waste water and surface water pipes, however LB Hackney has a combined foul and surface water network. Reducing the amount of surface water entering a combined network can help free up the capacity in the network for foul flows from growth. Thames Water predicts shortfalls in sewer capacity by 2050 under all growth scenarios, with major shortfalls in Hackney and Enfield (due to the combined sewage and surface systems and proximity to sewage treatment works respectively). This shortfall will occur earlier in the higher growth scenarios.
- Thames Water needs to undertake further modelling to confirm the investment required. Beckton sewage treatment works has been recently upgraded and Deepham's are currently being upgraded, but both may require further minor upgrades after 2012 and 2026 respectively with the higher growth scenarios.
- Thames Water is trialling the replacement of combined sewers with separate surface and wastewater systems in LB Hackney, which will reduce the interdependency between surface water and wastewater capacity and help to reduce flood risk.
- Site specific responses include diverting construction related ground water pumping from sewers to re-use; water management plans; and SUDS.

Flood Risk Management

- The ULV includes significant areas at risk from both river and surface water flooding.
- The Environment Agency is undertaking two flood alleviation schemes in the next 5 years at Dagenham Brook and Moselle Brook, and Boroughs have a number of smaller schemes planned.
- The EAs existing flood modelling data is out of date and will be replaced by a 'predict and provide' model, which is being piloted for the ULV; however this will not be available until 2017. This is hampering Boroughs' ability to plan surface water management strategies.
- Site specific responses to flood risk will arise through the planning process.

Overview

4.1 This section provides an outline of the responsibilities and policies of each organisation, then the current situation for potable, waste water (sewage) and surface water / flood risk and then sets out infrastructure required to facilitate development within the ULV. It also sets out the funding required and potential sources for this.

Environment Agency (EA)

4.2 The responsibility of the EA is to protect existing properties, residential or otherwise. The Environment Agency (EA) has responsibility for the modelling of flood risk and leads the development and delivery of, flood defence schemes across the country. At present, they do not have a predict and provide role but are instead reactive to development. They are however statutory consultees for planning applications and are therefore able to object to applications that are subject to flood risk. In addition, the EA are consulted by insurers regarding development and therefore development may be at risk if not protected within a flood risk area.

Ofwat

4.3 Water and sewerage services are provided by private companies. These are regulated by Ofwat, to ensure that consumers receive high standards of service at a fair price. One of the roles is to secure that the functions of each undertaker (that is, water company) are properly carried out and that they are able to finance their functions, in particular by securing reasonable returns on their capital.

4.4 Ofwat also seek to secure the long-term resilience of water companies' water supply and wastewater systems and to ensure they take steps to enable them, in the long term, to meet the need for water supplies and wastewater services.

Thames Water

4.5 Thames Water has a statutory duty to ensure the long term security and resilience of drinking water supplies for customers. Thames Water is responsible for the provision and maintenance of the main potable water supply infrastructure / distribution networks. This included the treatment of sewage for potable water supply purposes.

4.6 To help achieve this, every five years, Thames Water produces a Water Resources Management Plan (WRMP), agreed with the EA and Defra, following public consultation. The process is regulated by the EA following their guidelines for preparing the WRMPs.

4.7 The current WRMP14 (2015-2020) sets out how Thames Water will maintain a balance between the demand for water in their supply area and the available water supplies, whilst ensuring the environment is protected.

4.8 Thames Water also produces a longer term Strategic Business Strategy, with the current plan period being 2015-2040. One of their key targets is to increase the levels of wastewater recycling to meet the projected growth in water demand. Wastewater re-use is identified as the most significant water resource option for narrowing the gap between the amount of potable water needed and that available. However, a large number of uncertainties about its benefit remain, including the cost, the type of technology, how it might perform and its resilience.

4.9 Thames Water have identified some key longer-term influences which combine to increase the future gap between supply and demand and are likely to affect their business plans beyond 2020. Most of these will continue to exert strong upward pressure on costs. These include:

- climate change - this is increasingly affecting rainfall patterns, which, combined with population growth, is increasing pressure on security of supply and the capacity of their networks and treatment works;
- the need for greater resilience in water supplies;
- the need to reduce some current abstraction levels to protect the environment;
- rising energy and chemical costs;
- the requirement to adopt eligible private sewers and pumping stations from 2016 (eligible if serving two or more properties or located outside the property boundary); and
- assets reaching the end of their lives and the resulting requirement for replacement expenditure.

4.10 The Strategic Business Strategy also indicates that a detailed impact study will be taken by Thames Water in ULV. This would take six months and targeted asset enhancements are considered to be likely. The dates of this study are not yet available.

4.11 Thames Water's next Business Plan and WRMP (2020-2045) is being prepared for consultation in 2017/8 and will be released in 2018. This examines possible future options for:

- wastewater re-use facilities;
- reservoir storage;
- water transfer from other regions; and
- water supply options from other companies, including a reduction in the existing transfer agreements with Essex & Suffolk Water until 2030. This will save an extra 17 million litres of water per day for Thames Water customers.[4]

London Boroughs

4.12 Within London, managing surface water drainage is the responsibility of a number of organisations; the London Boroughs for example are required to provide SWMPs in line with the Flood and Water Management Act (2010) as part of their Local Development Framework process. This is usually informed by a Strategic Flood Risk Assessment (SFRA) to assess and map all forms of flood risk from groundwater, surface water, impounded water bodies, sewer, river and tidal sources, taking into account future climate change. The data from the SFRA is used to assist policy and planning decisions to ensure future developments are appropriately located, minimising damage to property and people.

4.13 Responsibilities also fall to developers under the London Plan (2016) and Borough planning policies to use SUDS unless there are practical reasons for not doing so. They should manage surface water run-off from new development as close to its source as possible to achieve greenfield run-off rates in new developments. Drainage schemes are required to be designed and implemented in ways that deliver other policy objectives of this Plan, including water use efficiency and quality, biodiversity, amenity and recreation.

Potable Water Supply

Current position - issues, opportunities and constraints

4.14 Potable Water forms one of three separate water infrastructure systems within the ULV, alongside waste water drainage and surface water drainage. Potable water is stored in reservoirs both in open and underground reservoirs.

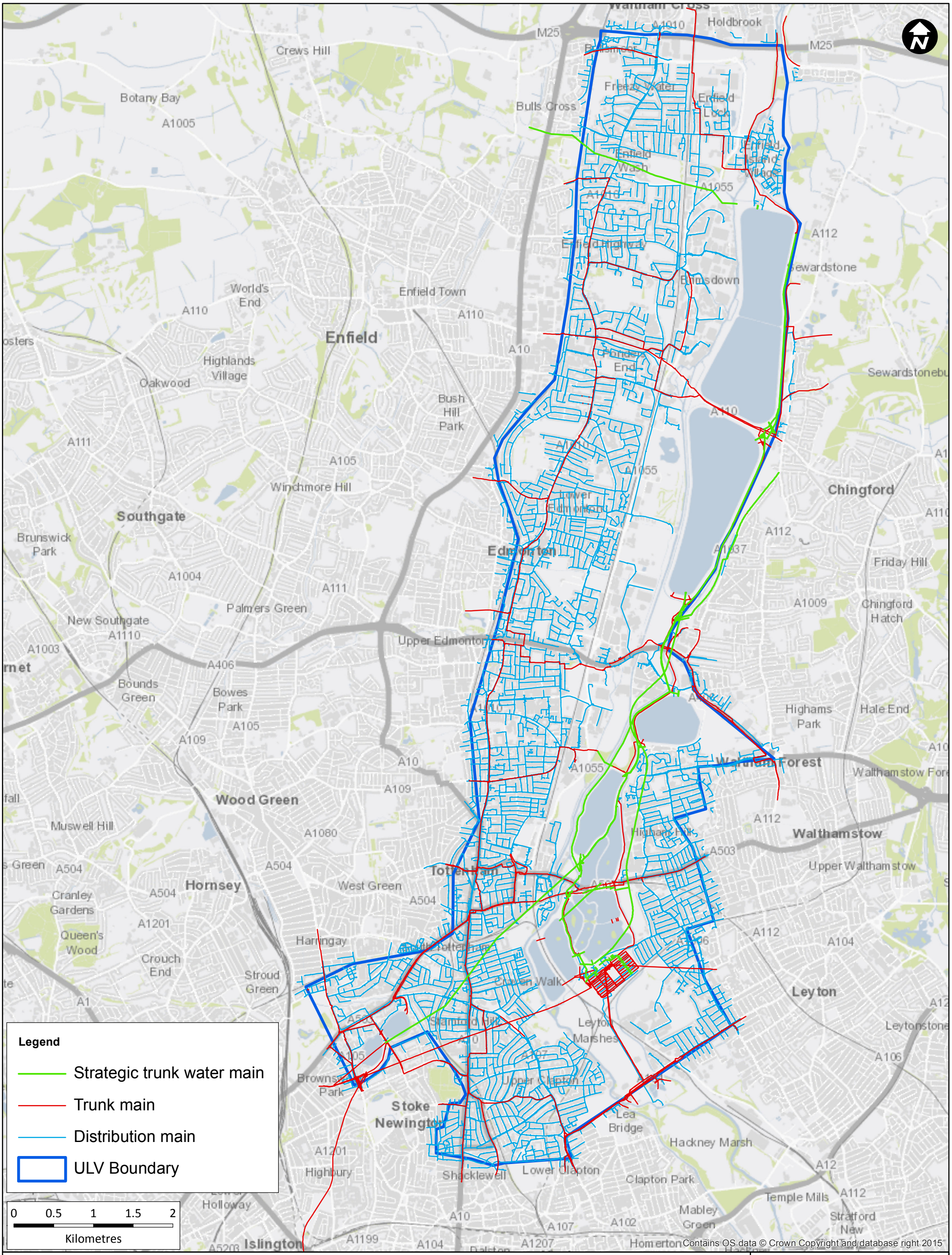
[4] "Summary of our draft five-year plan 2015 – 2020", Thames Water, accessed 18th April, 2016, http://www.thameswater.co.uk/tw/common/downloads/five-year-plan-summary-2015-2020(1).pdf

4.15 The Thames Basin is one of the most intensively used water resource systems in the world. Around 55 percent of effective rainfall is licensed for abstraction and 82 percent of that is for public water supply. In other words – for every two raindrops that fall in the Thames Basin, one is abstracted for use. As a result, Thames Water have little headroom during times of drought. Population growth in London and the effects of climate change add significant extra major challenges to ensuring sufficient water supply for the future. On average Londoners use approximately 167 litres of potable water per person per day. This is 14% more than the England and Wales average, despite London already being in one of the driest parts of the country.

4.16 The London Plan and Boroughs' planning policies require that mains water consumption is minimised to meet a target of 105 litres per person per day, and by 2016, achieve 80 litres per person per day, unless it is demonstrated that it is technically unfeasible to do so. Additionally, major non-residential development coming forward between 2016 and 2018 will be required to provide at least a 25% improvement in water efficiency.

4.17 Thames Water is currently implementing a range of measures to maintain water resources, including an intensive leakage reduction, and active water efficiency programmes. For example, the Beckton Desalination Plant opened in June 2010 and provides 150 million litres of potable water per day in times of drought by removing salt from the tidal Thames supplies. This serves the ULV and wider area. However, they consider that these initiatives will not, on their own, address the projected shortfall in potable water supplies in the long term. Major additional water resource infrastructure will be required (e.g. reservoirs, strategic water mains between London and water rich regions) as set out in the Thames Water Business Plan and WRMP.

4.18 Figure 4.1 shows that most of ULV is well served by high pressure water, referred to as strategic trunk and trunk water mains, as well as lower pressure distribution mains.



Upper Lee Valley DIFS

Figure 4.1: Upper Lee Valley Water Supply Network

steer davies gleave

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Changes to current provision and works needed to facilitate additional growth

4.19 Thames Water expects that the planned development in ULV will result in capacity problems for potable water unless network reinforcements are provided in time. Of particular concern is the impact on the trunk mains. Thames Water was provided with the list of developments and locations to assess the development scenarios using their own capacity assessment models. Although they have provided some preliminary indications of requirements for additional potable water capacity particularly under the Crossrail 2 scenario for sites immediately to the west of the reservoirs, these are heavily caveated and consider that a full detailed investigation of the need for new large mains and pumps to increase capacity and pressures, backed by detailed modelling will be required to provide a full review of water supply constraints. The draft WRMP 2020-2045 will be consulted upon in winter 2017 / spring 2018, and ahead of this Thames Water's Planning team are carrying out a detailed examination of what water resources are required.

4.20 Thames Water has stressed the importance of managing demand by encouraging efficient use and reuse of water, and is supportive of the planning system being used to increase the application of new water management technologies in development sites. This approach has been taken within the Water Strategy prepared to support the Tottenham Hotspur Stadium Redevelopment planning application and adopting a suite of water demand reduction measures has reduced the need for major upgrades or reinforcement of the potable water supply. Strengthening is however still required for the existing potable water distribution network along Tottenham High Road to serve Tottenham Hotspur Stadium Redevelopment but consists of simply opening an existing valve to allow a greater flow.

4.21 As part of its water resource planning Thames Water are currently looking at a range of potential locations for wastewater reuse in London, including at sites in the Upper Lee Valley area, such as at Deephams Sewage Works. This could offer the opportunity to provide an additional water resource for London. Wastewater reuse is being appraised alongside other options, such as new reservoirs and a transfer of water between regions. This would be in addition to the £200 million upgrade to Deepham's Sewage Treatment works (STW), for which permission has been granted. The upgrade is a phased reconstruction of the effluent treatment stream within the current site. The scheme will replace ageing assets, increase the capacity of the works, reduce the odour and meet new quality standards set by the EA. downstream for potable use.

Waste Water Drainage / Sewerage System

Current position - issues, opportunities and constraints

4.22 Wastewater is usually categorised as follows:

- **Surface Water**
  - **Rainwater–** surface water collected from roofs, hardstanding and in some cases road drains etc
- **Foul Water**
  - **Greywater** – waste water produced from baths, showers and washing machines; and
  - **Blackwater** – waste water generated by toilets, kitchen sinks and dishwasher.

4.23 New developments have two separate waste water systems between the development and public sewer, one system for surface water and one for foul water. These are required through the planning process and can help free up capacity in the network for foul flows.

4.24 However, many areas within London, including LB Hackney, have a waste water drainage system which then combines all three streams into “combined sewers”. This means that changes to any of the streams has a potential to affect the others.

4.25 The rest of the ULV has developed with separate systems for surface water drainage and for foul sewage (combined grey and black water). The capacity of the sewers therefore varies across the ULV area. The two types of mains sewers within the ULV are shown in Figure 4.2. The combined sewers are shown in red, and the separate surface water and foul sewage systems in green.

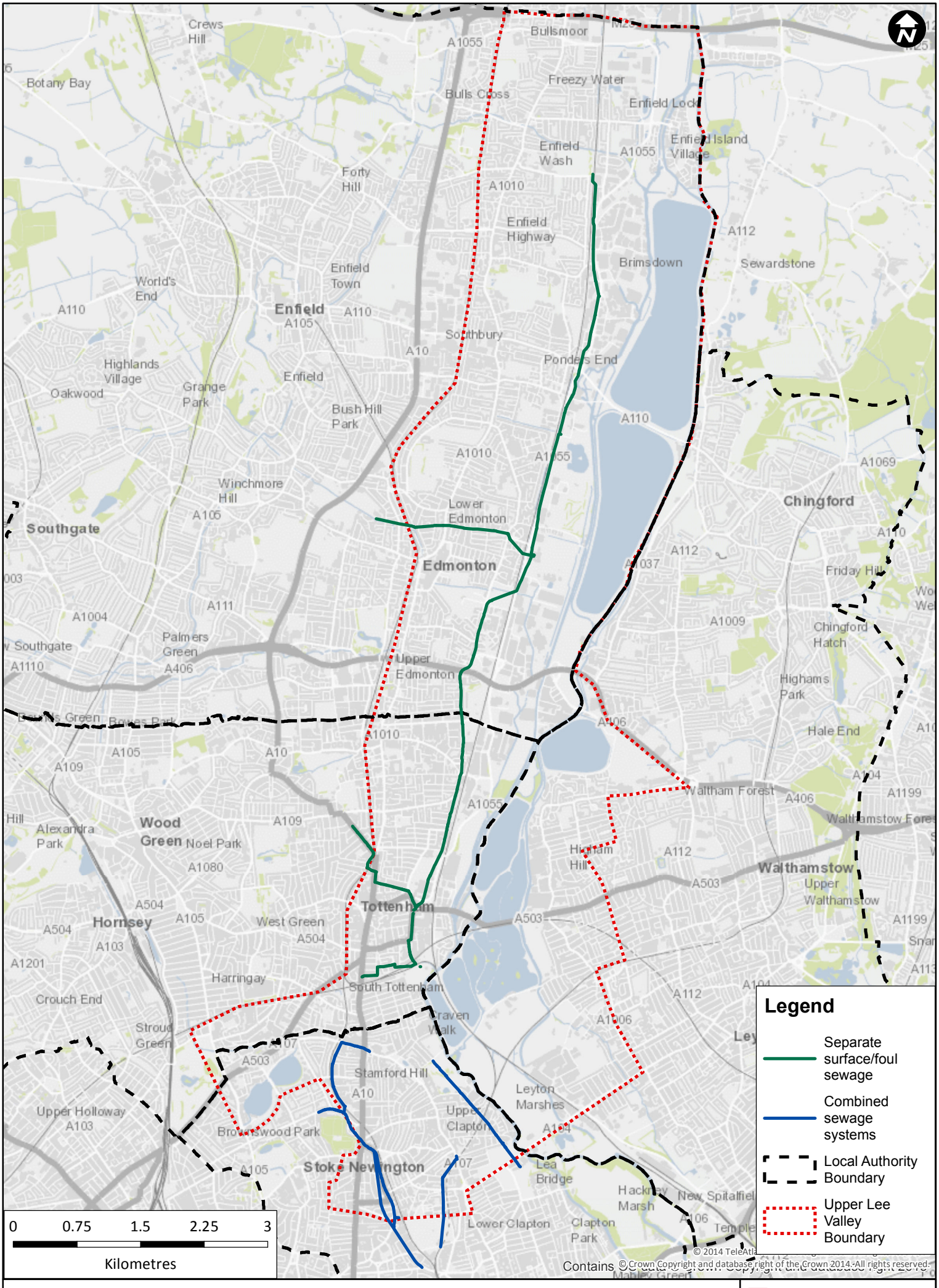
4.26 Thames Water has modelled the impact of London’s projected population growth and climate change on its drains and sewers to understand their ability to cope with these future challenges. The modelling shows that for a relatively common rainfall event in 2050 (one that would be expected on average once every other year), some areas of the Upper Lee Valley would not have sufficient sewerage capacity to manage the expected flows, leading to an increasing risk of sewer flooding. Figure 4.3 highlights the shortfalls in indicative sewer capacity levels for 2050 resulting from the high development growth predicted within the ULV.

4.27 Figure 4.3 shows that for a relatively common high rainfall event in 2050 (average of one in two years), some areas of ULV would not have sufficient surface water drainage or combined sewer capacity to manage expected flows, leading to increased risk of surface water and sewer flooding. The red and orange areas in the north of ULV, closest to the STW at Deephams have the greatest network constraints as they are carrying flows from a wider area. The further from the STW plant, the greater the available mains capacity, as shown in yellow.

4.28 In the south of the ULV, where a combined sewage network exists (in LB Hackney), the available capacity is minimal as shown in red. This area flows to the STW at Beckton. Although other areas (within LB Waltham Forest and LB Haringey) also drain to Beckton, the separate sewage systems mean that in 2050 the mains sewers draining to Beckton are predicted to be under less pressure.

4.29 Although Figure 4.3 provides an overview of the restrictions to capacity, further detailed hydraulic modelling is required in ULV to confirm local sewer asset capacity and target likely tactical investment to support the proposed growth (i.e. localised capacity enhancements Thames Water has not investigated localised network capacity further at this stage because the end connection point may vary from current predictions once a developer is in place. They have however provided indicative costs of between £100 and £500 per metre to lay piping for local networks.

4.30 Thames Water has provided detailed information on their policy regarding exclusion zones for constructing new developments surrounding their infrastructure, namely reservoirs, sewers and strategic trunk mains. The organisation prohibits any works within 25 metres of the base of the embankment of a reservoir, and there may be some sites in the Upper Lee Valley area that are affected. The exclusion zones are shown in **Appendix B**. However, it should be noted that Thames Water have not raised objections to some of the development that fall within this area (e.g. at Blackhorse Road station hub within the Blackhorse Lane Area Action Plan) so may not consider these restrictions to have an impact on the level of development here.



Upper Lee Valley DIFS

Figure 4.2: Location of mains sewers within ULV

steer davies gleave

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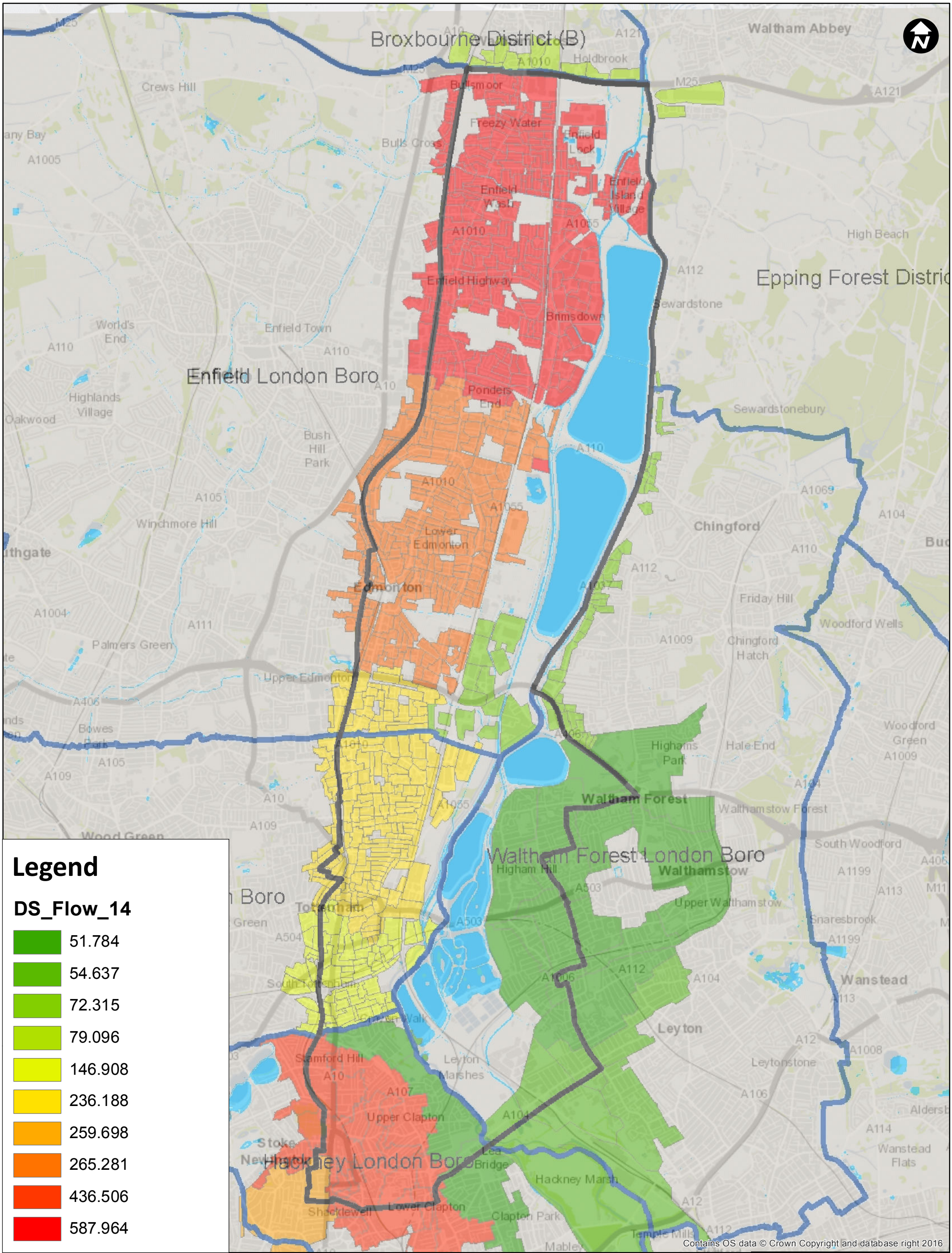

Legend

DS_Flow_14

- 51.784
- 54.637
- 72.315
- 79.096
- 146.908
- 236.188
- 259.698
- 265.281
- 436.506
- 587.964

Upper Lee Valley DIFS

Fig 4.3: Current Sewer Capacity. Source: Thames Water

steer davies gleave

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ORussell	04/07/2016	41,799

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4.31 Thames Water prohibit new developments within five metres either side of pipe edge of their strategic trunk mains infrastructure. The exclusion zones are shown in **Appendix C**. It also examines the piling methodology for new sites within 15 metres of a sewer (zones shown in **Appendix D**), although this is unlikely to significantly affect development capacity. Development within three metres of the edge of a pipe of public sewer will also need to be screened to consider construction impact. This exclusion zone policy could potentially limit the volume of development in certain areas of the OA. These should be examined through the pre-application planning process.

4.32 Thames Water consider that the groundwater that will be pumped from construction sites in the Crossrail 2 scenario presents an opportunity to increase water availability. It can be captured, treated and used as a potable or grey water resource thus not pumping ground water into sewers and using capacity. This approach was adopted in the "Stratford Box", where HS1 is within a tunnel under the Olympic Park. Here ground water continues to be pumped out and used in drought conditions.

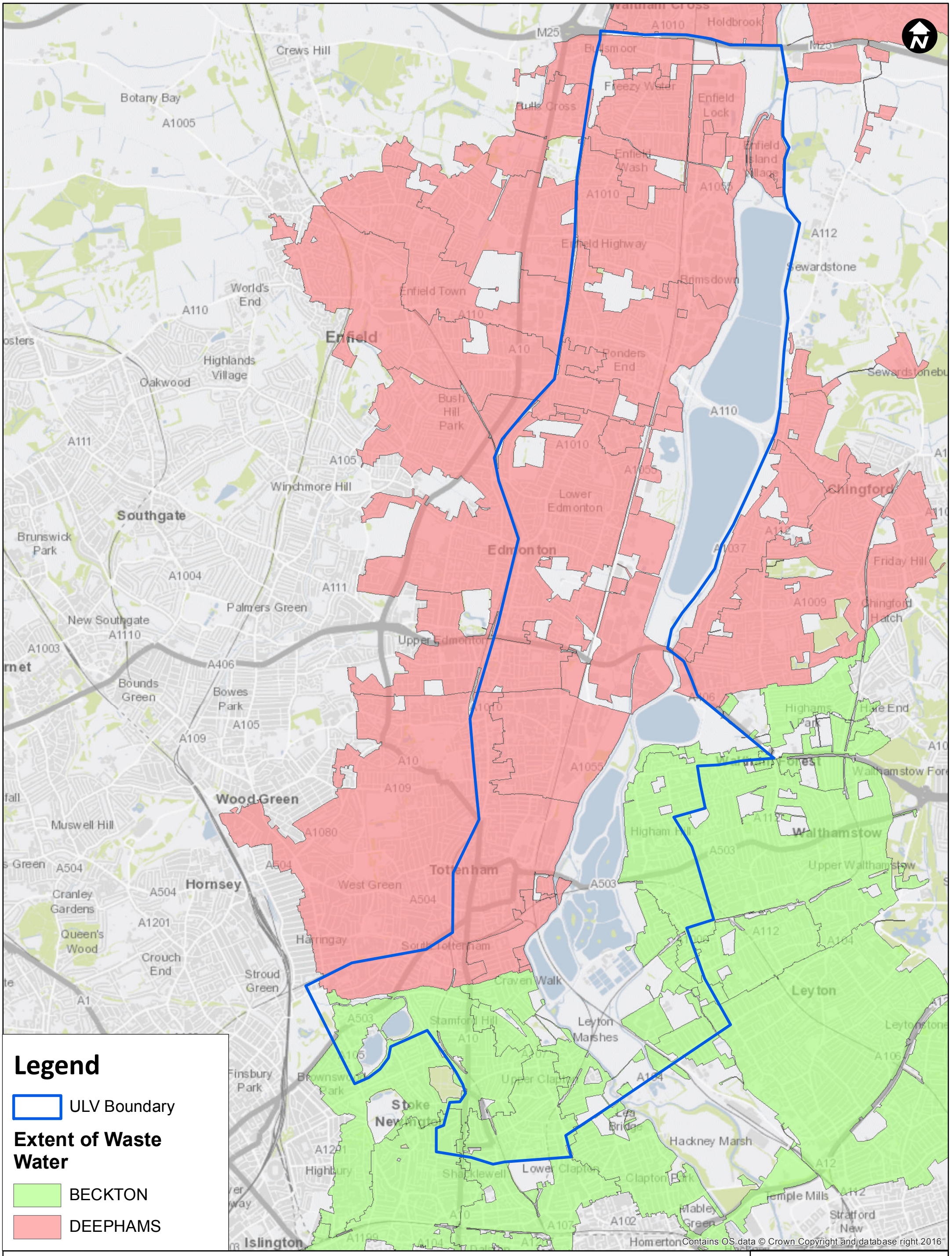
4.33 In order to reduce the demand for mains sewage capacity, particularly in the areas with combined sewage systems, additional capacity should be released through integrated water management plans for new developments. They should aim to reduce water usage and thereby reduce grey and black water waste, reuse grey water on site; and increase use and coverage of SUDS and reduce off site flows.

4.34 In addition to the mains sewage capacity, the capacity of water processing plants is important to consider. There are two processing plants that serve the ULV; Beckton STW and Deepham's STW. The combined surface and foul water of LB Hackney and LB Waltham Forest drains to Beckton STW and water from Haringey and Enfield to Deepham's. The two sewerage drainage area catchments are shown in Figure 4.4.

4.35 **Beckton STW** was upgraded between 2010-2015 to extend the treatment capacity and improve discharge quality standards of the existing STW facility to enable treatment of increased incoming flows. The upgrade has provided Beckton STW with capacity to treat a population equivalent of almost 4 million people. As well as therefore being able to accommodate the higher growth expected within the ULV, the facility will also treat flows from the Thames Tideway Tunnel and the Lee Tunnel.

4.36 **Deepham's STW** is currently being upgraded whilst maintaining current treatment capacity and will provide the facility's capacity until at least 2026. When completed, the scheme will improve sewage treatment processes, increasing capacity to a peak inlet flow of 497 megalitres per day, able to cater for a population equivalent of 989,000. The works are being funded through Thames Water's Capital Programme.

4.37 Thames Water currently expects Beckton and Deepham's STW facilities to have capacity to meet projected population demand until 2021 and 2026 respectively. However, after these dates Thames Water consider that it is likely that upgrades will be required to meet forecasted growth under either of the higher growth scenarios. The required works may involve additional tanks or new technology and processes. Thames Water will continue to keep under review which plant and processes will need upgrading for future growth.



Upper Lee Valley DIFS

Figure 4.4: Extent of waste water. Source: Thames Water

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Changes to current provision and works needed to facilitate additional growth

4.38 In order to address their concerns regarding the mains sewer capacity, Thames Water is currently identifying suitable locations (of up to 20 hectares) in London to trial the practicality and costs of reducing or removing the surface water from the combined sewerage systems, linked to introducing Sustainable Urban Drainage Systems (SUDS). The objectives are to increase capacity and address issues of climate change and growth. Within the ULV this could be very valuable within LB Hackney in particular. These trials are taking place during the current Business Plan period (2015–2020), however the associated costs of such schemes have not yet been determined. Network infrastructure can cost in the region of £100 to £500 per metre of new sewer or water main.

Surface Water Drainage

4.39 As mentioned each of the boroughs are responsible for the surface water management. Within the ULV, each borough has therefore either adopted or has emerging policy to support surface water reduction through a variety of measures as shown in Table 4.2.

Table 4.1: Borough Surface Water Drainage Policy

Borough	SUDS requirement	Other relevant policy
Enfield	All new development requires SUDS. Preference for above ground SUDS.	Flood Risk Assessment required if within flood risk area. Finished floor levels should be at least 300mm above the 100 year plus climate change flood level and dry access route must be provided above 100 year plus climate change flood level. No net loss of flood storage on site.
Hackney	All new development requires SUDS.	Demonstrate an overall reduction in flood risk. Development that does not support aims of National Policy PPS25 will be refused. Flood Risk Assessments (FRAs) are required for all developments within Flood Zones 3, 2, and sites greater than one hectare in size in Flood Zone 1. Where development is permitted in areas at risk of flooding, existing flood defences should be protected. The retrofitting of flood resilient and resistant measures will be encouraged.
Haringey	All new development requires SUDS.	Flood Risk Assessments (FRAs) required for sites highlighted within site allocations. Take account of flood risk vulnerability classification as set out in paragraph 100 of the NPPF and will apply the NPPF Sequential Test and Exception Test to direct development away from areas of flood risk. Implement measures to prevent (or mitigate as last resort) local surface water and downstream flooding.
Waltham Forest	Provide SUDS to ensure greenfield run-off rates.	Development should not reduce flood storage or increase flood risk elsewhere. Use/retain permeable materials in areas of hard standing. Providing mitigation measures where there are residual impacts; and where necessary, providing new/upgraded infrastructure and/or financial contributions towards measures to reduce and mitigate. Provide maintenance and management plan for all drainage systems including SUDS.

Source: Borough planning polices

4.41 These requirements will affect the design of developments within the flood risk area within the ULV. Providing dry access routes and above ground SUDS may impact on scheme viability. However as the provision of these measures can help gain credits towards BREEAM accreditation and compliance with Code for Sustainable Homes, the overall impact on viability should be minimal.

4.42 Thames Water recommends that stronger water and wastewater management policies should be included as part of next London Plan revision in order to encourage more innovative SUDS and co-ordinated approaches to water management within areas such as the ULV.

4.43 LB Hackney has recently made a submission and been shortlisted for Wick Road, Hackney to be one of Thames Water's 2020 Pilot Projects on introducing area-based SUDs.

Funding of additional water and sewage utilities infrastructure and works

4.44 Any major infrastructure developments identified in Thames Water's Business Plan cycle are, at least part funded through their capital programme which in turn is funded primarily from customer revenue. This is true of the current and future upgrades of Deepham's STW and Beckton STW. There is however no publically available list of these projects for review.

4.45 Currently the Water Industry Act 1991 (WIA91) allows water companies to charge developers for providing network infrastructure and connecting new developments to the water and wastewater networks for domestic purposes. These charges are intended to reflect the costs of the infrastructure needed and the different ways the infrastructure is funded. This system is complex and there is currently under review by Ofwat. Consultation on the proposed changes was undertaken in early 2016.[5]

4.46 The review has highlighted issues with the existing charging regime as detailed in **Appendix E**. The current and proposed charging regimes for developers are summarised below, followed by a review of implications for delivering higher levels of growth in ULV.

Current charging regime

4.47 There are four main ways in which Thames Water can recharge development-led infrastructure to developers; different charges apply, depending on how the infrastructure is provided, as set out in Table 4.3.

Table 4.2: Existing Thames Water Charging Regime

Charge Type	Description
Connection	Developer reimburses Thames Water for the cost of providing a physical connection from a development to the water main / sewer.
Infrastructure	Developer contributes to Thames Water's investment in general improvements to the existing network, to meet increasing demand, paid when premises are first connected to a water main / sewer.
Requisition	Developer pays Thames Water to provide new water main(s) or public sewer(s) and associated infrastructure to connect new substantial developments to their network. The charge is intended to recover only part of the reasonably incurred costs; the anticipated revenue (billing) income from occupiers for the following 12 years makes up the difference.
Self-lay & Asset payments	Developer funds and builds the network infrastructure to serve their development. Developer pays Thames Water for any additional infrastructure required (some of which only they may be able to build). Thames Water then 'adopts' the assets and pays the developer for the infrastructure.

Source: Thames Water

[5] Ofwat, *New connections charging – emerging thinking for discussion,* 24 March, 2016

Emerging charging regime

4.48 The Water Act 2014 changed the Water Industry Act 1991 to allow Ofwat to set rules for connection charges for all water companies. Defra therefore provided guidance to Ofwat (July 2016)[6] on revising the charging rules structured around four key objectives.

- fairness and affordability;
- environmental protection;
- stability and predictability; and
- transparency and customer-focused service.

4.49 Ofwat have consulted on changes to the charging regime[7]. The proposals replace infrastructure charges and other charges associated with off-site reinforcement with a single zonal charge, rather than being calculated based on the actual costs of any single identified development. The zonal charge is calculated to reflect the total forecast value of infrastructure required within a given area (for example, an OA) to meet the need of developers over a given period of time.

4.50 Ofwat considers that this approach would to some extent, reduce the relationship between the cost and the charge at a specific-site level and provide developers with clear upfront certainty of the charges that they will be exposed to. It would also help to address the "first mover" issue - i.e. the first site to be developed bears the highest or full infrastructure costs - as all developers (first and subsequent) would be subject to the same average costs within a given area and time frame.

4.51 Ofwat consider that the main challenge will be to require water companies to develop suitable forecasts of the expected level of costs to be incurred in relation to new developments within specified locations over a defined period. While this forms part of the current price review process it is carried out at an aggregate company-wide basis, rather than being location specific.

Implications for ULV

4.52 The outcome of the Ofwat charging rate consultation, if adopted, will require the water providers to be more transparent and identify required infrastructure in advance. This may help to improve the speed of delivery for services to support development.

4.53 It is likely to improve the fairness and consistency of charging however, for smaller developers they may see increased cost compared to present which may in turn have some impact on viability, but the costs would be known from the outset to enable informed decisions.

Flood Risk Management

Current position - issues, opportunities and constraints

4.54 Flood risk is dependent upon a number of factors including distance to rivers / sea, level of watercourse, type of mains sewer system (combined increases flood risk) and surface water run off rates (brownfield sites increase flood risk).

[6] "Consultation on Charging Guidance to Ofwat", Defra July 2015

[7] "New Connections Charging, Emerging Thinking for Discussion", Ofwat, 24 March 2016

Environment Agency (EA)

4.55 As mentioned, the EA is responsible for protecting properties and as part of this role is a statutory consultee for planning applications. The EA therefore undertake modelling to ascertain flood risk and consider different levels of development appropriate in each zone as shown in Table 4.4.

Table 4.3: EA Flood Risk and Development Potential

Flood Zone	Flood Chances	Development considered appropriate
1	Less than 1 in 1000 chance in any given year	Residential
2	Less than 1 in 100 but greater than 1 in 1000 chance in any given year	Residential
3a	Greater than 1 in 100 chance every year and outside the functional floodplain	Residential – but with exception test; Shops, restaurants and offices – provided they don't increase the risk of flooding elsewhere by displacing flood waters or by blocking overland flow routes
3b	Greater than 1 in 100 chance every year and within the functional floodplain	None

Source: Tables 1-3 of the Technical Guidance to the NPPF[8]

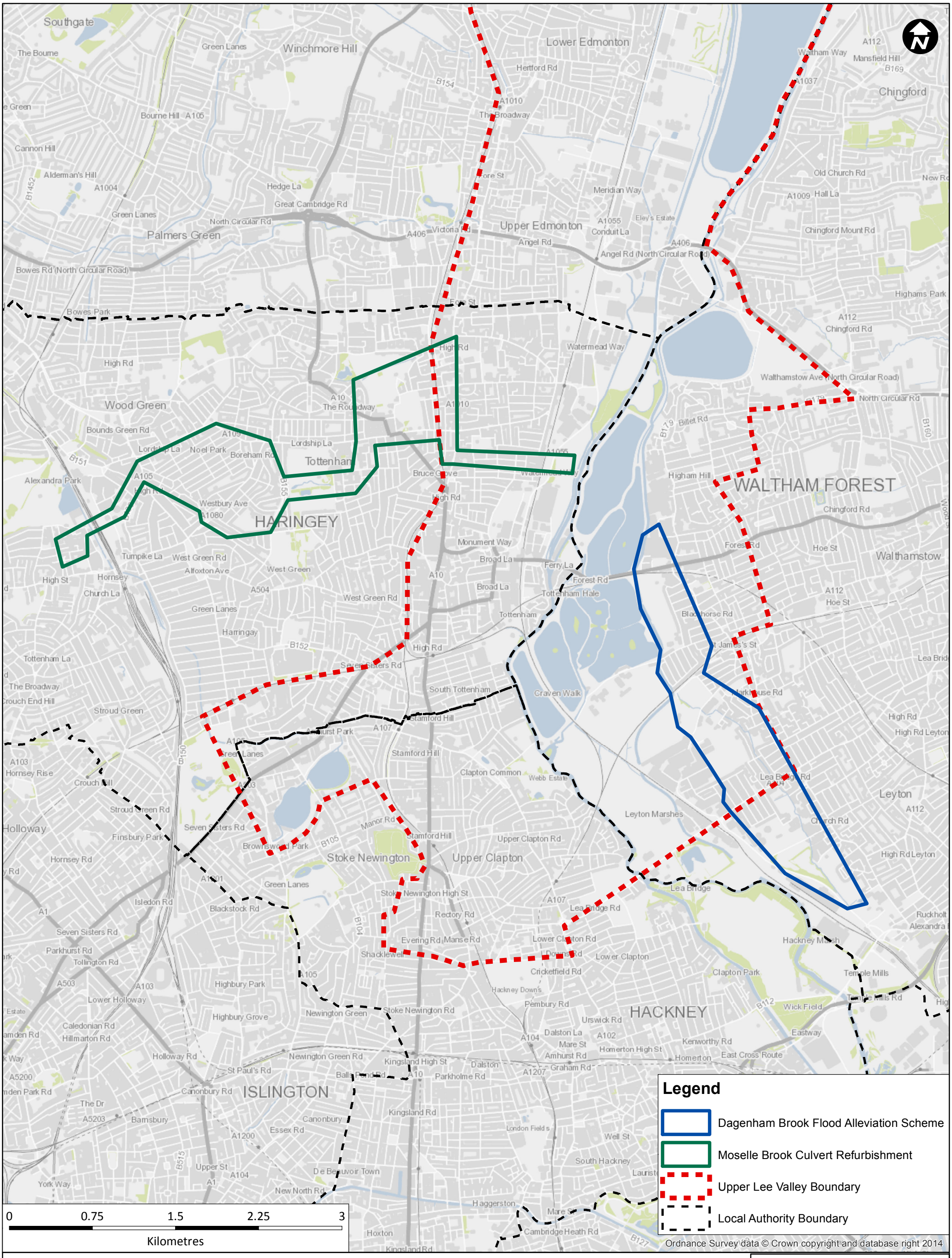
4.56 For existing property, the EA has a medium term plan (next 5 years) which is updated yearly and sets out measures or schemes to protect existing property based on information provided by their modelling. In order for a scheme to be supported within the 5 year plan, the cost-benefit analysis needs to be greater than 1:1 (value of property v cost of scheme) in order to obtain funding from Central Government. If less than 1:1, partnership agreements will be sought including S106 contributions from developers. The schemes are also ranked so that those with the highest cost benefit ratio are prioritised.

4.57 The EA has two funded schemes in the medium term plan within the ULV area: the Dagenham Brook Flood Alleviation Scheme and the Moselle Brook Culvert Refurbishment as shown in Figure 4.5. These schemes will assist in increasing their carrying capacity for surface water to reduce flood risk in the area.

4.58 With the level of development and pressure for additional homes within London and the south east, the EA are piloting a new approach to planning for climate change, moving towards a 'predict and provide' model. The ULV has been selected as the study area for the pilot because of the high growth projections and is undergoing investigation to develop a new model that utilises improved flood risk data for the area. The model includes a 20% allowance on climate change over the next 100 years which is thought to be appropriate for considering the appropriateness of development in locations. The model also distinguishes between land use because residential properties are considered more valuable than commercial.

4.59 Improved flood risk data is now available to allow the model to be re-run and graphical outputs provided however this will not be available until at least early 2017. Once this data is available it could be used to influence development locations within the ULV.

[8] DCLG, Technical Guidance to the NPPF, Table 1, March, 2012



Upper Lee Valley DIFS

Figure 4.5: Current EA Flood Schemes within the ULV

steer davies gleave

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SWellington	24/05/2016	30,000

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Boroughs

4.60 The boroughs rely upon the EA for flood risk modelling data to develop their policies and plans. Unfortunately for ULV, the last flood risk modelling was last undertaken in 2010, which formed the GLA evidence base for the ULV OAPF. The EA considers this data to now be out of date and boroughs need to wait until the pilot study data is available in 2017. Subsequently it is difficult to determine vulnerable sites in the short term for DIFS Phase 2.

4.61 Without this modelling data, it is difficult for Boroughs to fulfil their statutory responsibilities to develop current surface water management strategies. LB Hackney has therefore commissioned their own study of fluvial flood risk in Hackney Wick to inform their Core Strategy and site allocations for development. The flood hazard and risk maps are anticipated in July and therefore unavailable for the DIFS Phase 2. The boroughs have however defined some local surface water drainage and flood defence schemes using existing data, as shown in Table 4.4. Indicative costs and expected funding sources are also provided. Although some of these are outside the opportunity area boundary, they do impact the Upper Lee Valley, hence their inclusion.

4.62 The list provided in Table 4.4 will require updating following release of the ULV modelling study in 2017.

Table 4.4: Summary of Planned Flood Alleviation Schemes

Borough	Scheme	Cost	Funding Source
Hackney	Hackney Wick Additional flood defence wall	£800k	Funded by multi-agency, cross borough and possibly private developers. The scheme is unlikely to quality for national Flood Defence Grant-in-Aid due to existing standard of protection
	Hackney Marshes Additional flood alleviation	£6-10m	
	Northwold / Norcott / Alconbury Road CDA, Upper Clapton - flood mitigation works	£1-10m	Possible funds from Drain London Project
	Railway tracks to Rectory Station CDA, Stoke Newington - flood mitigation works, de-culvert and increase flows	£251 – 500k	
	Railway cutting and tunnel entrances from Clapton station to Hackney Downs CDA – de-culvert and increase flows	£251 – 500k	
	Lordship Road CDA, Stoke Newington - flood mitigation works	£501k – £1 m	
Enfield	Decontamination of Turkey Brook At Albany Park (T267) - scheme to prevent overflow of Turkey Brook Pipe Crossing)	£100k	Infrastructure – from developers through S106 or CIL when CIL Charging Schedule is in place.
	Preparation of flood compensation area at Meridian Water (T268) – enabling works for development of Masterplan area	£2.14m	Maintenance will be carried out by EA, LB Enfield or other agency dependent upon ownership
	Montagu Road (T270) CDA (Critical Drainage Area) – Increase flows to reduce flood risk in combination with downstream flood storage areas	£200k	Unknown
	Bullsmoor Lane (T272) - increase drainage capacity and storage	£300k	Unknown
	M25 Holmesdale Tunnel drainage (T273) – reduce flood risk to M25 tunnel	£1m	Unknown
	Moselle Brook	£4.5m	
	Sunnyside Road East / Barbot Close CDA, Edmonton - flood mitigation works	£101 – 250k	Possible funds from Drain London Project
	Brimsdown Avenue CDA - highway flood mitigation works	£1-10m	
	Holmesdale Tunnel CDA - M25 junction flood mitigation works	Less than £25k	
Haringey	Tottenham Hale SUDS	£20.6m	Unknown
	Tottenham High Road and suburbs CDA, Tottenham Hale - flood mitigation works	£1-10m	Possible funds from Drain London Project
	Culvert Road and Seven Sisters Road CDA, South Tottenham - flood mitigation works	£1-10m	
Waltham Forest	Heron Close (junction Priors Croft and North Countess Road CDA, - flood mitigation works	£1-10m	Possible funds from Drain London Project
	Blackhorse Road Station and Overground railway line to the east CDA - flood mitigation works	£1-10m	

Funding of additional utilities infrastructure and works

4.63 Flood defence schemes are part or wholly funded by central government. The proportion of funding from central government is determined by the number of properties protected by the proposed scheme. Partnership funding is now encouraged, so schemes which previously fell below 100% government funding and would not have been taken forward, have an opportunity to progress using other funding sources. As the detail of a scheme is developed its likely impact is more certain, as is the funding from central government.

4.64 There are various stages in the process of finalising a flood scheme, where the detail is refined each more detailed than the last, and each revising the proportion of central government funding. Where a flood scheme has been assessed, the likely proportion of funding is included in the funding gap assessment. For all other schemes it is assumed that 50% of the cost of each scheme would be funded by Central Government, leaving a 50% funding gap.

4.65 As the EA don't predict and provide, financial contributions will be negotiated with each developer having regard to their proposed run off rate. The developer may choose to undertake more works to mitigate run-off rates (e.g. enhanced SUDS or flood water attenuation) or pay an increased Section 106 contribution. The cost of mitigation schemes per household depends on several variables, including the size of development site and type of housing (flats or houses).

5 Broadband

Headlines

- Broadband speeds within the ULV are variable, with higher Superfast Broadband capacity coverage than the UK average, but lower Ultrafast capability
- Boroughs perceive a problem due to lack of Ultrafast capacity
- Networks are generally developed by providers through capital expenditure where there is a critical mass of end users, with costs recouped through consumer revenue. Therefore higher growth scenarios should help to improve provision due to increased number of end users
- The competitive nature of network "layers" results in suppliers installing infrastructure when known rather than in anticipation of development
- Current hierarchy of providers results in a monopoly and in many cases limited or no choice for consumers but reduces costs for developers
- Planning policy could reduce this monopoly by ensuring an open network in developments and enable increased competition in the market
- Suppliers are developing innovative solutions to provide broadband and therefore should not pose a limit on the higher growth development scenarios
- Works to install broadband network should be managed by the highway authority to coordinate with other utilities to minimise disruption for the highway network

Current position

5.1 This section on broadband collates information from the following sources:

- discussions held between Steer Davies Gleave and seven telecommunication providers and also the four ULV London Boroughs;
- business plans of the seven telecommunication providers; and
- publications from third parties available in the public domain.

5.2 In our discussions with the boroughs, both LB Enfield and LB Waltham Forest identified the limited broadband in the OA as a potential disincentive to regeneration. This is particularly true of areas that are planned to support high tech industries including Meridian Water, Tottenham Hale / Tottenham Hotspur Stadium Redevelopment and Enfield Lock and its surrounding area. The boroughs also noted the difficulty experienced in engaging the broadband industry, due to the competitive and commercially sensitive nature of the sector.

5.3 Although Steer Davies Gleave also experienced difficulty engaging the telecommunication providers, discussions were possible with the following providers as part of this phase of the study:

- Optimity;
- Hyperoptic;
- Sky;
- Openreach (part of the BT Group);
- Virgin Media;
- City Fibre; and
- ITS Technology Group.

5.4 These providers all noted issues with digital connectivity within London at present.

5.5 The British Infrastructure Group published statistics on existing broadband provision in January 2016. Current provision in ULV, compared to that of the UK and the Cities of London and Westminster are shown in Table 5.1. The speed in constituencies give an indication of speeds across the wider borough areas.

Table 5.1: Existing Broadband Provision in ULV

Constituency	Borough	Superfast broadband availability %	Ultrafast broadband availability %	Average download speed (mb/sec)
Edmonton	LB Enfield	98%	0.0%	36.9
Enfield North		97%	0.5%	39.5
Hackney North and Stoke Newington	LB Hackney	93%	0.0%	33.0
Tottenham	LB Haringey	97%	0.1%	35.4
Walthamstow	LB Waltham Forest	96%	28.7%	37.2
City of London/Westminster		78%	2.1%	16.9
United Kingdom average		84%	2.3%	29.4

Source: British Infrastructure Group, 2016[9]

5.6 "Superfast" broadband usually represents part fibre services with download speeds of between 25–80 megabytes, whilst "ultrafast" represents the next step up in broadband technology with download speeds of at least 80 megabytes or more. Table 5.1 identifies that the majority of ULV does not have access to ultrafast broadband for Fibre to the Cabinet (FTTC) services.

5.7 The study highlights that certain parts of the ULV have greater access to superfast broadband than the national average and central London. This access to superfast broadband means that the average download speeds are comparatively faster in the ULV than the national average. That said, further ultrafast broadband is required to support the growth of high connectivity dependent business sectors such as scientific and technology-based businesses. With the exception of Walthamstow, access in the ULV is lower than the national and City of London/Westminster average.

Understanding broadband infrastructure

5.8 The supply of broadband infrastructure is complex, with different "layers" within the network. There are three main types of infrastructure provider, the first providing the physical

[9] British Infrastructure Group, *Broadband: A new study into broadband investment and the role of BT and Openreach,* 23rd January, 2016, Appendix 2

infrastructure, the second operating the active equipment to create the network and the third supplying the telecommunication services. Further detail on each of these different roles, along with examples of suppliers that operate in each of the network "layers", are set out in Table 5.2.

Table 5.2: Network layers and business roles

Type of business role	Brief description	Example of provider / user
Physical infrastructure provider (PIP)	Owns and maintains: • passive infrastructure (ducts, cables, masts, hardware) • active equipment (implementing the technology – routers, fibre boxes, converged network)	Openreach (part of the BT Group), NTT Europe, ITS Technology Group for passive infrastructure, Virgin Media, CityFibre, Optimity
Network provider (NP)	Operates and typically owns the active equipment. Places equipment in all access nodes to which any of its customers are connected.	Hyperoptic, Openreach (part of the BT group), Optimity, Virgin Media
Service provider (SP)	Delivers the telecommunications services (broadband, TV, telephone etc). Can be small or large companies selling services to end users over an NP's connectivity network. • Inbound service = embedded service like e-mail • Over the top content = Amazon, Netflix, Google	ITS Technology Group, Hyperoptic, BT(retail), Optimity, Sky, Virgin Media
End user	Private citizen, small or large company, a hospital, a school, a public administration etc, who is purchasing services over the network	Resident, Commercial business, Public buildings

Source: European Commission (2014), discussions with ITS Technology Group (February 2016)

5.9 The different hierarchies result in two distinct types of business model, a vertically integrated model and an open network model. The different models result from the fact that the different layers of infrastructure have different lifespans and likely returns on investment:

- The infrastructure has a 10-100 year lifespan with a 2-8% margin return on investment (ROI).
- The network has a 3-5 year life span, with a 30-50% margin ROI.
- Services and content has a six months – 3 years lifespan with a 60% margin ROI.[10]

5.10 Companies therefore choose to operate in one or more of the "layers". The important point to note is that the two overarching models (vertically integrated or open network) lead to different practises by each of the companies and they impact upon developers and consumers in different ways. Table 5.3 provides further detail of the two business models.

[10] Discussions during a conference call between Steer Davies Gleave and ITS Technology Group on 19 February, 2016

Table 5.3: Types of different broadband business models

Type of broadband business model		Brief description	Example of suppliers
Vertically integrated model		Where one market actor takes on all 3 roles of PIP, NP and SP. The network owner designs the network to deliver its own services. Gives access to its competitors in forms compatible with the network design	• BT Group (Openreach – PIP & NP, BT retail –SP) • Virgin Media
Open network model	• Passive-layer open model (PLOM) • Active-layer Open Model (ALOM) • Three-layer Open Model (3LOM)	Where the market roles are separated between different companies Infrastructure is available to all market participants at equal conditions	All wholesale and retail SPs • ITS Technology Group • Hyperoptic • Optimity • Sky • Talk Talk

Source: European Commission (2014), discussions with ITS Technology Group (February 2016)

Vertically integrated model

5.11 A vertically integrated model is used to describe a model where a supplier provides the full set of infrastructure (i.e. they are the Physical Infrastructure Provider, Network Provider and Service Provider). The network owner designs the network to deliver its own services.

5.12 The vertical operator has significant market power as they normally own the passive and active infrastructure and offer services to end users. Examples of these in London are Openreach (part of the BT Group) and Virgin Media; however these companies can also operate in the second type of model (open network).

5.13 The vertically integrated model is becoming less popular due to the requirement for high capital reserves to provide the full network. Instead, suppliers are tending to form collaborations to operate one or two 'layers' of the network instead through the open network model.

Open-network model

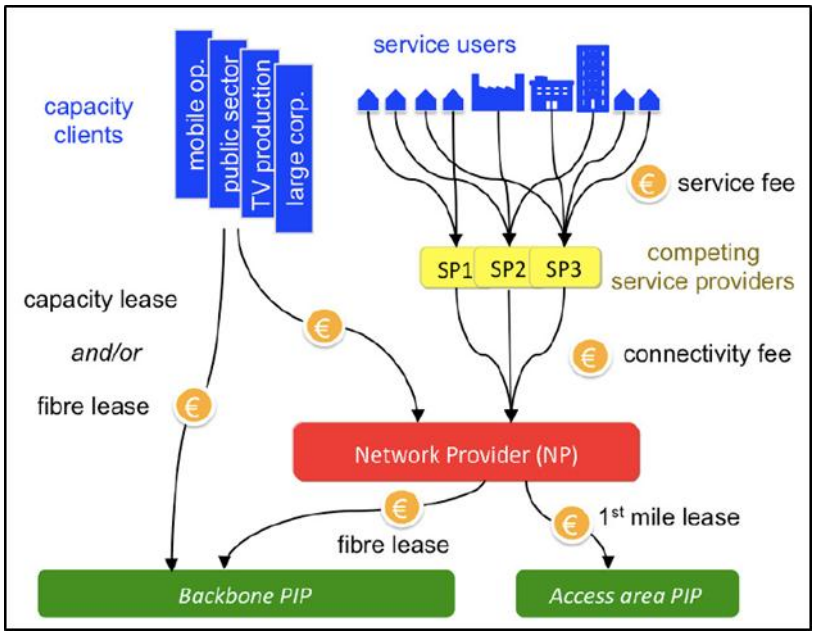
5.14 An open network model differs because different parts of the infrastructure are operated by different companies. i.e. different suppliers provide one or more of the PIP, NP and SP infrastructure. To add to the complexity, the open network model can operate in three different ways, Passive-layer open model (PLOM), Active-layer Open Model (ALOM) and Three-Layer Open Model (3LOM).

5.15 In a **PLOM**, the end users have a free choice of either SP or network *and* SP, to whom they pay a service fee. The infrastructure provider may receive revenue from the end user in the form of either a one-off connection fee, and/or a monthly network fee. This type of model is best suited for relatively large and densely populated areas, for example ULV. It is typically used by public-run networks in large cities, in which the public authority takes on the role of both physical infrastructure and NP. This is seen with ITS Technology Group using the CCTV ducts available from LB Hammersmith and Fulham.

5.16 In an **ALOM**, the active equipment is placed in all access nodes and builds an open, operator-neutral network over which all SPs can deliver their services to end users. The physical infrastructure and NP receive revenue from the SP to deliver their services to the end users.

5.17 A **3LOM**, is similar to the PLOM; however the local authority assigns the role of NP to a nominated company. This company places active equipment in all access nodes and builds an open, operator-neutral network over which all SPs can deliver their services to end users. A figure illustrating this type of open network broadband business model is shown in Figure 5.1. The end user chooses the services from the operator of their choice and pays a service fee to the SP. This fee includes a network fee payable directly to the NP.

Figure 5.1: Operation of three-layer broadband open model



Source: European Commission, *Guide to High-Speed Broadband Investment*, 22 October 2014, Release 1.1

Planning strategy

5.18 With an understanding of the different infrastructure and SP structures, this section details the current status of each of the providers within the ULV and details of how they currently, and plan to, operate within the ULV. Each of the companies were provided with details of the expected development in each of the growth scenarios for the ULV and respond to this information.

Openreach (part of the BT Group)

5.19 Openreach (part of the BT Group) currently maintains and owns the exchanges and main cabling systems linking the exchanges to local cabinets and from cabinets to virtually every home and business in the UK. Currently large parts of the network are formed of copper or coaxial cable network. This is outdated as it has slower transmission speeds and cannot support ultrafast broadband[11].

[11] British Infrastructure Group, *Broadband: A new study into broadband investment and the role of BT and Openreach,* 23 January, 2016, Appendix 2

5.20 The Fibre To The Cabinet (FTTC) programme aims to replace their copper network between exchanges and cabinets with a fibre network to increase speeds and allow additional connections from other SPs. FTTC connections allow other service operators like Sky, Talk Talk to use Openreach's infrastructure. They have committed to connecting an additional three million residential units in the UK to fibre (through FTTC).

5.21 In addition, for all new developments Openreach is providing Fibre to the Premises (FTTP). This is provided at no cost to all new developments over 100 units, for under 100 units developers are asked to contribute. The major cost in fibre deployment is not the fibre cable itself, but rather the civil works to install it. The company is likely to construct a fibre rather than copper network across London's OAs due to the high volume of projected growth.

5.22 Openreach's Capacity Planning team has reviewed the nature and capacity of the all telephone exchanges in ULV in relation to the development proposed under the four-tracking and Crossrail 2 scenarios. They have concluded that there are seven telephone exchanges within the OA's boundary which offer some 'fibre spine' capacity but with limited 'Exchange' side capacity (i.e. from Exchange to properties). Table 5.4 provides details of the capacity for each of the exchanges.

Table 5.4: Openreach (part of the BT Group) Exchange capacity in ULV

Borough	Exchange	Summary of existing condition
LB Enfield	Lee Valley (L/LV)	Next Generation Access (NGA) enabled Primary Connection Points (PCPs) Limited exchange side capacity Some fibre spine capacity
	Ponders End (L/HOW)	Both NGA and non-NGA enabled PCPs Limited exchange side capacity Some spine capacity Possibility to re-use Ethernet fibres
	Edmonton (L/EDM)	NGA enabled PCPs Limited exchange side capacity Some fibre spine capacity
LB Waltham Forest	Higham's Park (L/LAR)	Predominately an existing FTTP brownfield exchange area
LB Haringey	Tottenham (L/TOT)	NGA enabled PCPs Limited exchange side capacity Some fibre spine capacity
LB Hackney	Stamford Hill (L/STA)	NGA enabled PCPs Limited exchange side capacity Some fibre spine capacity
	Clapton (L/UUP)	NGA enabled PCPs Limited exchange side capacity Some fibre spine capacity

Source: Openreach (part of the BT Group), 2016

5.23 Openreach (part of the BT Group) is currently reviewing its dark fibre network, which refers to the fibre optic cables that are currently in place but are not being used. Fibre optic cables convey information in the form of light pulses; therefore "dark fibre" means no light pulses are being sent. Unfortunately the study will not be completed and published until 2017 so at this stage it is not known whether spare dark fibre capacity is available within the ULV area.

5.24 That said, Openreach (part of the BT Group) has stated that they will be able to provide fibre connectivity to the sites identified for growth either through the use of existing infrastructure or the installation of new fibre network and this will be confirmed on a site by site basis as each one becomes 'live'. This is subject to the individual developers requesting the Connectivity Assessments twelve months prior to constructing each of the sites and then formally contracting with Openreach (part of the BT Group) nine months prior to construction. This is a long standing procedure.

Sky

5.25 Sky's business model currently works on wholesaling Openreach's (part of the BT Group) open network model. It also owns the Cloud WiFi system which significantly increases connectivity across the UK. Sky is currently awaiting the financial and operational results of an ultrafast broadband trial undertaken in York. This was undertaken in collaboration with CityFibre, who installed new fibre network, and Talk Talk. The results will determine whether the business model could be rolled out to other areas in the UK, including ULV. The results are due in summer 2016. Sky are confident that partnerships between different broadband network and service providers are likely to form the future broadband business model.

5.26 The company is unfamiliar with the existing broadband network and capacity in ULV, but believe it will be difficult to roll out a fibre network in the area due to the narrow and dense roads which would cause high disruption. Micro-tunnelling is a possible construction technique, but this is costly and would also cause road closures. Openreach (part of the BT Group) could string fibres more easily between telegraph poles. Sky have identified that Openreach (part of the BT Group) is probably the best network for bringing fibre forward in new developments, but will not provide this to existing developments which rely on copper.

5.27 Sky has suggested that it would be useful for London to register and map the broadband connectivity of individual buildings, as is done in New York City. This would identify disadvantaged areas on an ongoing basis.

Virgin Media

5.28 Virgin Media operates its own fibre optic network, separate to Openreach (part of the BT Group), through a vertically integrated broadband model. A core network also exists along the A1055 public highway between Tottenham Hale and the M25 boundary which covers several of the proposed sites. This is shown in **Appendix F**.

5.29 This highlights a "headend" (similar to a telephone exchange box) is available within Waltham Forest (labelled "Walt Hub" in **Appendix F**). This is served by a 32 kilometre fibre optic trunk network which routes from this point to Canary Wharf, West Silvertown and forms a loop back to the Waltham Hub. New land has been acquired within Waltham Forest to provide additional connection capacity.

5.30 Virgin Media launched Project Lightening in summer 2015. This is a £3 billion network expansion to areas of the UK that do not have fibre optic connectivity, for example Canary Wharf which uses a duct network. They do not have any firm plans for new fibre optic cabling in ULV, and will normally only provide this where there is less than 25% capacity on the existing network. It is likely however this could be required at Blackhorse Lane in LB Waltham Forest which is proposed to become a major employment location.

5.31 Virgin Media pays UK residential developers a fixed fee to install their equipment in residential buildings with over 50 units, often referred to as "Multi-Dwelling Units" (MDUs). Customers

within the MDUs are consequently only able to purchase telecommunication and broadband services from Virgin Media, placing them in a monopoly position.

5.32 Research undertaken by Samknows[12] on behalf of LB Enfield states that 82% of properties within the borough are able to access Virgin Media's services, which is considerably above the UK average.

ITS Technology Group

5.33 ITS Technology Group has worked with LB Hammersmith and Fulham since 2014 to provide digital services to social housing estates using the authority's existing CCTV / traffic control duct network. ITS Technology Group aims to work with other local authorities across the UK to design, build, develop and manage a broadband network. They currently have no fixed plans to work with the ULV local authorities but are interested in future opportunities in this part of London.

5.34 Soft market reviews are undertaken by local authorities to determine whether there would be market interest from network and service providers, if an open business model was promoted. Existing ducts are available in LB Haringey and LB Waltham Forest through a combination of council-owned CCTV and urban traffic network controls. Discussions between the broadband provider and LB Enfield ended after the Council conducted a soft market review in 2015 and identified that there was an insufficient network to make the operator's commercial model economically viable. ITS think it is unlikely that the other boroughs in ULV would be interested, based on the results of LB Enfield's review.

5.35 ITS Technology Group is however keen to expand their network and therefore is prepared to provide duct infrastructure in business parks within the ULV and defined Enterprise Zones (EZ). They have followed this approach at Skylon Park EZ in Herefordshire. The company placed a fibre network using existing "open access" duct networks that were constructed and funded in highway land as through a S106 planning agreements. Herefordshire County Council also invested capital to provide fibre connectivity into individual development sites. ITS would invest further capital where opportunities are made or exist to use the open access networks.

5.36 In the future it will also be possible for ITS to provide core and access networks through the ULV area using Openreach's existing infrastructure through a joint venture or concessionary basis.

Hyperoptic

5.37 Hyperoptic has worked in Old Oak Common, Barking Riverside and Old Kent Road OAs, and presented to the GLA on the various broadband business models. The company provided broadband for the Olympic Village residential development near ULV, and works closely with over 75 private residential developers.

5.38 Hyperoptic uses the open network business model which is best suited to MDUs with enough potential customers to warrant investment. They run their own fibre network using pre-existing cables ducts owned by Openreach (part of the BT Group) (typically) between exchanges and buildings. Being able to use the infrastructure provided by the PIPs allows them to be nimble. However they do require a critical mass of customers (such as MDUs or a high

[12] LB Enfield – Infrastructure Delivery Plan Review 2014

density business park) and the effectiveness of model is dependent upon the costs of using Openreach infrastructure.

CityFibre

5.39 CityFibre operates a modern fibre optic network, completely separate to Openreach (part of the BT Group) or Virgin and provides ultrafast broadband. The company's business model is similar to ITS Technology Group where they use the duct network under a local authority's control to install their own cabling. However their business model is different as the local authority does not invest in the infrastructure or enter a joint venture, but instead becomes the first guaranteed end user of the fibre network.

5.40 This model has been trialled in York where 200-300 small and medium enterprises (SMEs) in addition to 2,000 residential units will have fibre connectivity by July 2016. With the support of York City Council, CityFibre has provided the local authority with 150 kilometres of backbone fibre optic cabling. This infrastructure was previously owned by York City Council but has been transferred to CityFibre's control.

5.41 CityFibre do not currently operate a network within ULV. However they consider that there could be an opportunity to utilise the former KCOM Group network infrastructure that connects all the large data centres from Milton Keynes to the City in London. This runs through several OAs including sections of ULV, Barking Riverside, Royal Docks and Beckton Riverside. CityFibre acquired KCOM Group's national fibre and duct network assets in December 2015. The capacity of the central spine of this network is currently underutilised with capacity for fibre cables from any service provider. CityFibre are due to meet with LB Newham during 2016 to discuss opportunities.

Optimity

5.42 Optimity offers business to business broadband using a non-wired network that does not rely on Openreach (part of the BT Group) or Virgin Media's infrastructure. The wireless network uses antennas or "landing points" that must be located within four kilometres of one another and must be placed on buildings with a maximum height of 12 storeys. The only wires required are within the office from the router to the antenna on the roof, and the system uses a very low power source.

5.43 London will be provided with its first 5GB connection in December 2016 by Optimity. Optimity has worked with developers and LB Haringey in the "digital corridor" surrounding Tottenham Hale. There is potential for high wireless connectivity currently in the Shoreditch and East London Tech City area to be extended into LB Haringey and attract businesses.

5.44 The company is currently considering additional antenna locations, which could be delivered through ULV from the Olympic Park at Stratford to follow the railway track northbound where clear sightlines are already provided. This is necessary for the wireless system to be successful and can be difficult to find where there are electricity pylons and electromagnetic fields. The challenge is finding the landing points as the route would need to go via Meridian Water or Tottenham Hotspur Stadium Redevelopment. Optimity perceives difficulty in communication with Network Rail and therefore may seek alternative installation solutions.

5.45 The northern area within LB Enfield is thought to currently have low connectivity due to its light industrial and low density land use. This provides a potential opportunity to be one of first places in the UK to have a 5GB connection and resultant high land value uplift.

Issues, opportunities and constraints

Issues and constraints

5.46 LB Enfield has engaged in dialogue with Openreach (part of the BT Group) to address connectivity issues across the borough. Enfield town centre and industrial business areas are outside of Openreach's investment plans and therefore LB Enfield intends to maximise the opportunity offered by the GLA and Department for Culture, Media and Sport Superconnected Cities Programme scheme. LB Enfield were awarded £400,000 to undertake a pilot phase between December 2013 and March 2014.

5.47 Gaining access to lay cables beneath the streets was a common issue raised by suppliers, due to the disruption that it causes. It is therefore important for utility companies to reduce this disruption wherever possible, but also requires TfL and GLA to ensure that works between utility companies can be coordinated to reduce disruption and increase access to these suppliers.

5.48 Hyperoptic highlighted that the quality of broadband speeds within taller buildings is distance dependent; top floors have poorer connectivity than at lower levels. Buildings taller than 90 metres may require boosters or demarcation points serving upper floors, which is costly. They also stressed the benefits of broadband providers working with developers at the early masterplanning stages for new developments, to ensure that the most effective infrastructure is provided for broadband delivery. New developments therefore have the economic advantage of better infrastructure which is beneficial for ULV.

5.49 Openreach (part of the BT Group) has open cable ducts with high capacity all over London and these tend to have sufficient capacity for SPs' infrastructure. However, often the constraint is the distance to the telephone exchange and capacity within these.

Opportunities

5.50 Cable TV duct networks were built in the 1980s in most authorities, but have not been used since the company Rediffusion went into liquidation in the 1990s. Only local authorities hold the planning records of the locations of such cable TV ducts; however they may not be aware of their existence or may not have protected them during street and highway works. It would be useful to discuss such ducts with the ULV boroughs to understand if such networks are available for the running of fibre optic cables. This has been done by ITS Technology Group in Bristol where the Council acquired over 150 kilometres of cable TV duct networks from Rediffusion's administrators.

5.51 It would also be beneficial for Crossrail 2 to make provision for new ducts along the railway line, or for Network Rail to include this as part of four-tracking upgrades. These would need to be placed on the edge of the tracks (using J-hooks or similar) rather than underneath rail lines to minimise disruption (and reduce the time required to gain access), but could help reduce disruption under roads when installing and maintaining these ducts and services.

5.52 Independent Fibre Networks Limited noted the benefits of increased customer choice where open active network ducts, available to all SPs, are installed in new development. They suggested that this requirement should be adopted as London Plan policy to apply to all new development to the benefit of ULV and all other OAs. This could be secured through planning condition and funded through either S106 contributions or CIL.

Planned schemes, timings and known costs

5.53 The cost of broadband varies depending on the supplier, however due to the commercially sensitive nature of costs, not all companies have disclosed this information. Although those are commercially sensitive, on average an estimate of £150-250 per residential unit is required for the additional infrastructure being brought forward in the OA. There may be cost savings for economies of scale, but these have not been disclosed by the service providers.

5.54 70-80% of the Capital Expenditure relates to civil infrastructure, which includes building masts, labour costs, etc. A provider that uses a wireless system like Hyperoptic has very little infrastructure and subsequently low Capital Expenditure.

6 Energy and Waste

Headlines

Gas

- High / Medium pressure Gas valves and their exclusions zones are within close proximity of a handful of development sites in the three scenarios, however diversions for some are already underway to e.g. Meridian Water to maximise the developable area
- Recent gas network upgrades by National Grid have provided sufficient high and medium pressure for forecast development including the higher growth scenarios
- Requirements for low pressure supplies are dependent upon the development type, scale and quantum; however National Grid do not foresee problems meeting any of the growth scenarios
- Low pressure mains upgrades are not complex and therefore it is not thought to be a limit on any of the development scenarios at this time

Electricity

- UKPN have confirmed there is currently sufficient capacity in the high voltage transmission system in the southern ULV to accommodate the anticipated growth for all scenarios, due to recent upgrades
- In the north of ULV, future upgrades have been identified to the high voltage system, but the schemes are on hold until the demand is likely to be triggered. For lower voltage systems too, there is insufficient capacity for the Crossrail 2 scenario, for which UKPN have identified upgrades

Waste

- Energy from waste represents a good opportunity for future energy generation, however it will also reduce the constraints on landfill.
- At present additional capacity is required for Commercial and Industrial Waste.
- Recent upgrades at powerday in Brimsdown have helped increase capacity for Local Authority Collected Waste, but there is a need for the larger more efficient replacement waste treatment facility at Edmonton EcoPark, currently progressing through Development Consent Order to provide capacity for all growth scenarios.

Gas

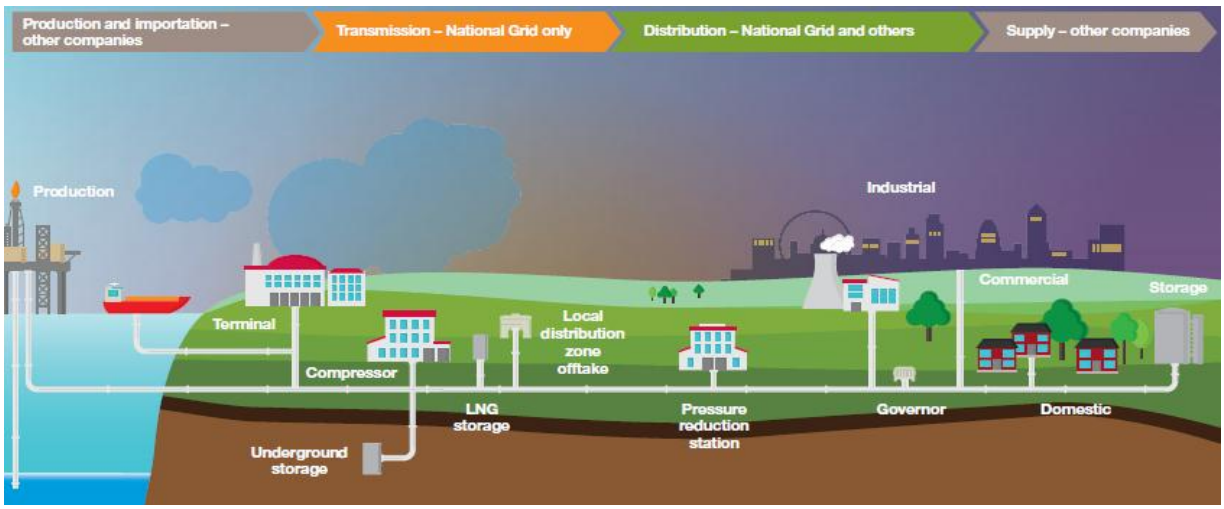
Current position - issues, opportunities and constraints

Gas Distribution Network (GDN)

6.1 Gas is supplied through a series of pressurised gas mains. National Grid transports gas to the ULV (with companies e.g. British Gas providing gas to customers). The high pressure distribution network transports and stores the gas, which is then cascaded down the intermediate, medium and low pressure tiers.

6.2 Gas is supplied from the National Transmission System (high pressure) and then transported to customers via the Local Distribution Network. Pressure reduction stations in the local distribution network reduce gas pressure via a number of pressure tiers with most customers supplied from the final low pressure network.[13] This is illustrated in Figure 6.1.

Figure 6.1: Gas Network Distribution Illustrative



Source: National Grid

6.3 The intermediate / medium pressure gas mains are shown in Figure 6.2. These mains generally follow the route of the public highway network and provide gas supplies to residential and commercial properties. This network is used by National Grid and capacity is used on a first come basis with additional capacity provided as required through the new connections process.

[13] "Long Term Development Plan 2015", National Grid Gas Distribution, accessed 20 April, 2016, http://www2.nationalgrid.com/UK/Industry-information/Developing-our-network/Gas-Distribution-Long-Term-Development-Plan/

Legend

- Medium Pressure Gas Distribution Mains
- Intermediate Pressure Gas Distribution Mains
- Upper Lee Valley Boundary
- Local Authority Boundary

0 0.75 1.5 2.25 3

Kilometres

Upper Lee Valley DIFS

Figure 6.2: Intermediate and Medium Gas Mains in ULV

steer davies gleave

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P:\Projects\227\6\30\02\GIS\MAPPING\ARCGIS\Map_Documents\Exclusion Works\Figure 6.2 Upper Lee Valley Pressure Distribution Mains_Final 2 no sites and Labels.mxd

6.4 National Grid Gas do not currently anticipate any major offsite 'general' reinforcement of the supply network for any of the proposed growth scenarios, however local onsite 'specific' reinforcement may be required subject to particular customer requirements.

National Grid's current plans and strategies- schemes, timings and known costs

National Grid's Long Term Development Plan (2015)

6.5 The London Supply Strategy is part of the long term development plan and focusses on a 15 year plan to replace London's Victorian high pressure cast iron mains, however none of the proposed replacements are within ULV. The report highlights that when National Grid quote any connections charges to other gas transporters / supply companies, their network capacity is assessed on a first-come, first-served basis. For long-term projects, information about available capacity is likely to be out of date by the time a development is complete. Over the lifetime of a development, the cumulative effects of a large number of loads may well overload the upstream systems and must therefore be managed carefully. National Grid is able to identify if there is suitable infrastructure available to supply a known development site and work with the developer to address.

Changes to current provision and works needed to facilitate additional growth

6.6 National Grid has examined and undertaken preliminary assessments of the development implications of baseline and the two growth development scenarios provided by Steer Davies Gleave. They have assessed the likely impacts on the whole gas distribution network to the supply point.

6.7 National Grid's assessment was based on the assumption of temperature sensitive peak loads and did not take into account future process or power generation loads, for example a Combined Heat and Power (CHP) facility. It is assumed that residential developments are energy efficient with 'good' or 'excellent' BREEAM rating or similar standard, and that the proposed employment sites do not have high energy demands. National Grid also does not take account of any other wider industry changes.

6.8 The costs of reinforcement works typically rise through the pressure hierarchy, with the low pressure (plastic or cast iron) network usually significantly cheaper than the reinforcement of intermediate pressure (steel) network. The largest of works required within the ULV is at Meridian Water, where two diversions of medium pressure gas lines are required to facilitate the development. The development will use district heating and electricity for energy once the Lee Valley Heat Network (LVHN) is operational in December 2018. In the meantime, a temporary gas supply is required from medium pressure mains to a temporary district heating solution. This is awaiting approval from National Grid.

Impact of growth scenarios

6.9 The higher growth scenarios (4-tracking and Crossrail 2) are consistent with the forecasts published in National Grid's *Long Term Development Plan (2015).* National Grid considers that any required works to the low pressure network is unlikely to have a major impact on the overall development and phasing strategy.

Funding of additional utilities infrastructure and works

6.10 In order for new development to be connected to the gas supply National Grid provides an individual quotation for connection. National Grid as a regulated company and is bound by the Gas Act 1986.

6.11 Gas infrastructure can be paid for in different ways, depending on the type of infrastructure in question:

- Local on-site connections are paid for by the developer.
- Governor and new medium pressure mains from the Connection Point into development are funded by the developer. The connection charge is based a standard price per kWh of forecast gas usage, plus the cost of materials, labour and ancillary costs including any licence payments to third parties, including highways authority.
- Mains reinforcement upstream of the Connection Charging Point - costs are jointly funded between the developer and National Grid. This apportionment is subject to a separate economic analysis exercise. The contribution will be equal to the excess of the costs associated with the new load over the capitalised transportation revenue.

6.12 The costs of connection are shared between connecting customers and the wider customer base. For example, if a domestic customer within 23 metres of existing pipelines requests a new connection, then the first 10 metres of pipeline is paid for by the wider customer base and the rest would be paid by the connecting customer.

6.13 There is substantial competition for the provision of new and modified connections to the gas networks by utility infrastructure providers.

Electricity

Current position - issues, opportunities and constraints

6.14 National Grid own and operate the high voltage electricity transmission system serving ULV, whilst UK Power Networks (UKPN) own and operate the lower voltage electricity distribution networks. The grid connectors between the high and lower voltage systems are jointly owned / managed by National Grid and UKPN.

6.15 The high voltage transmission system in the southern ULV was upgraded to serve the Olympics and is believed to be able to accommodate the anticipated growth. There is currently some capacity in the network at the northern end and National Grid has already obtained the necessary consents for network and transformer upgrades to meet future growth. This scheme is currently on hold until the demand is likely to be triggered.

6.16 UKPN have identified that the ULV development area encompasses and is bordered by five ‘Grid’ substations and nine Primary substations. The ‘Grid’ substations illustrated in Figure 6.3 transform power from 132kV to 33kV and have a large footprint and provide supplies to a large geographic area. UKPN have advised that one Grid substation can provide for approximately one outer London borough. The exception of this is Northumberland Park which is a dedicated Network Rail substation. The Primary substations transform power from 33kV to 11kV has and have a smaller footprint than grid substations. These are shown in green in Figure 6.3. The Primary substations provide more local supplies and as a general rule UKPN have three to six Primary substations for every Grid substation.

Waltham Park Grid (North of the M25) 132kV/11kV

Brimsdown North Grid (Adjacent to National Grid) 132kV/33kV

Brimsdown South Grid 132kV/11kV

Ladysmith Road Primary 33kV/11kV

East Enfield Primary 33kV/11kV

Ponders End Primary 33kV/11kV

Bury St Primary 33kV/11kV

Central Edmonton Primary

Deephams Sewage (Customer) 33kV/11kV

South Chingford 33kV/11kV

Northumberland Park (Network Rail) 132kV/25kV

Bruce Grove Primary 33kV/11kV

Tottenham Grid 132kV/33kV

Central Tottenham Primary 33kV/11kV

0 0.75 1.5 2.25 3

Kilometres

Legend

- Primary Substation
- Grid Substation
- Upper Lee Valley Boundary
- Local Authority Boundary

Upper Lee Valley DIFS

Figure 6.3: UK Power Network Substation Map

steer davies gleave

Created by:	Last Updated:	Scale:
SWellington	24/05/2016	20,000

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6.17 The 'Grid' substations illustrated in Figure 6.3 transform power from 132kV to 33kV and have a large footprint, a larger number of assets and provide supplies to a large geographic area. UKPN have advised that one Grid substation can provide for one outer London borough. The exception of this is Northumberland Park which is a dedicated Network Rail substation. The Primary substation which transforms power from 33kV to 11kV has a smaller footprint and a number of assets. These provide more local supplies and as a general rule UKPN have three to six Primary substations for every Grid substation.

6.18 A summary of the capacity in the boroughs is set out in Table 6.1.

Table 6.1: UKPN Summary of Electricity Capacity by borough

Borough	Capacity summary	Schemes
LB Haringey	Approx. 10MVA available at 11kV from Bruce Grove and Central Tottenham Primary Substations	• Project to allow 38MVA capacity of the transformers at **Bruce Grove Primary Substation** to be fully utilised – completion 2018. • 33kV switchgear was recently replaced at **Central Tottenham Primary Substation**
LB Enfield	Approx. 24MVA available at 11kV from Brimsdown South, Ponders End, Central Edmonton, East Enfield, Ladysmith Road, Bury Street Primary Substations and Waltham Park Grid. An additional 14MVA is available from other substations.	• By 2019 11kV switchgear will be replaced at **Ponders End Primary Substation** • By 2023 existing transformers will be replaced at **Ladysmith Road Primary Substation**, providing potential increase in capacity of 20MVA at the site • By 2023 33kV switchgear will be replaced at **Bury Street Primary Substation**
LB Waltham Forest	Approx. 10MVA available at Blackhorse Lane (66/11kV) Primary Substation	None
LB Hackney	Approx. 12MVA will be available once Edwards Lane works are complete	• Reinforcement works are currently underway at **Edwards Lane Primary Substation** (66/11kv)

Source: UKPN

6.19 Table 6.1 shows that there is 70MVA of spare capacity at present, with the schemes listed increasing this.

6.20 UKPN have undertaken assessments for power demand under each of the three growth scenarios using the development quantum provided to them. For properties using gas heating, it is assumed that residential units require an electrical demand of 2kW, commercial and retail units 0.03kW/m² and hotels 0.04kW/m². The "worst case" scenario of Crossrail 2 subsequently presents the electricity demand shown in Table 6.2.

Table 6.2: Electricity Demand under Crossrail 2 scenario

Borough	Electricity demand by land use (MVA)				Total
	Residential	Commercial	Retail	Other Land Uses	
LB Haringey	31.7	3.4	2.0	0.6	37.7
LB Enfield	46.1	3.7	1.1	0.0	50.9
LB Waltham Forest	6.8	0.3	0.2	0.0	7.3
LB Hackney	12.2	0.3	0.3	0.0	12.8
TOTAL	**96.9**	**7.6**	**3.7**	**0.6**	**108.2**

Source: UKPN

6.21 The worst case forecast total electricity demand for the OA is 108.2 MVA, which does not take into account increased demand from other developers bringing forward windfall sites or increasing development intensity, transport providers (e.g. Crossrail 2) and utility companies in the ULV. This figure can be used to provide a high level indication of capacity and identify potential reinforcement projects. This type of increased / changing energy demand is identified through UKPN's internal review of network capacity, which they undertake annually. This considers a 3-5 year demand horizon and identifies and plans reinforcements, to be part funded by developer contributions and capital expenditure.

6.22 UKPN highlighted that a substantial power requirement and significant upgrade would be needed to the electricity supply to serve Crossrail 2. Network Rail were proposing reinforcement of one of the two sub-stations at Brimsdown which serves their rail system. This appears to be on hold and UKPN not aware of latest position, but will form part of their annual review process as information becomes available. The upgrade planned for Deepham's STW would also require an increased electricity supply.

6.23 UKPN also noted that the M25 presents a constraint for any cable routes from Waltham Park Grid substation (north of the M25) to the development sites in LB Enfield. Brimsdown South currently has 8 MVA capacity and East Enfield 7 MVA capacity. This is sufficient for high level growth up to 15,000 new homes; but if future residential development is delivered at a rate of between 2-3,000 per annum, further reinforcement or diversions will be requires around 2020-2021 (ignoring increased demand from utilities, windfall developments etc). The options at this time will be either to:

- reinforce existing network capacity (part funded by UKPN / developers); or
- provide an additional link from Waltham Park which has significant capacity (40 MVA). A new link under M25 has engineering difficulties though and would add additional time and costs, however these are expected to be less than the overall cost of network reinforcement of £3 million. This would need to be fully funded by developers as it is an extension to the network.

6.24 These options will be explored by UKPN over the next 3-5 years through the annual review process, when detailed design and costing would be drawn up.

Planned schemes, timings and known costs

6.25 National Grid's *Electricity Ten Year Statement (ETYS) 2015* provides a spatial breakdown of demand and supply to assess the needs of the electric transmission network across London. London's energy import relies heavily on the surrounding 400kV and 275kV circuits. The

circuits currently entering from north London can be particularly heavily loaded at winter peak conditions, and can be a bottleneck for power flow from East Anglia.

North London Reinforcement Project

6.26 The North London Reinforcement Project will upgrade a 14km stretch of overhead electricity line from 275kV to operate at 400kV. It is a Nationally Significant Infrastructure Project (NSIP) and was granted consent in 2014 with validity for eight years, however there are no immediate plans to proceed with the project. National Grid will review this on an annual basis, which may be activated by the ULV development proposals. The route between the Waltham Cross and Tottenham Substations is shown in Figure 6.4**.**

6.27 Upgrade work will also take place at Waltham Cross substation to provide new 400kV switchgear and modify the connection between the overhead line and new substation. Brimsdown substation (LB Enfield) will also be upgraded to have two new 400/132kv supergrid transformers with underground cable connections. These avoid the need for additional pylons to free up developable space.

Waltham Cross Substation

Brimsdown South Substation

Central Tottenham Primary Substation

Hackney Substation

ZBC 1
ZBC 2
ZBC 3
ZBC 4
ZBC 5
ZBC 6
ZBC 7
ZBC 8
ZBC 9
ZBC 10
ZBC 11
ZBC 12
ZBC 13
ZBC 14
ZBC 15
ZBC 16
ZBC 17
ZBC 18
ZBC019
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ZBC 21
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ZBC 39
ZBC 40
ZBC 41
ZBC 42
ZBC 43
VC 1
VC 2
VC 3
VC 4
VC 5
VC 6
VC 7
VC 8
VC 9
VC 10
VC 11
VC 12
VC 13
VC 14
VC 15
VC 16
VC 17
VC 18

Legend

- Substation
- Route of ZBC overhead line
- Route of VC overhead line
- ZBC pylon (with reference no.)
- VC pylon (with reference no.)
- ZBC Winching sites
- VC Winching sites
- Upper Lee Valley Boundary
- Local Authority Boundary

0 0.75 1.5 2.25 3
Kilometres

Upper Lee Valley DIFS

Figure 6.4: North London Reinforcement Project

steer davies gleave

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Supplementary works required to facilitate additional growth

6.28 Work undertaken by UKPN to assess electricity demand under the higher growth (Crossrail 2) scenario highlights capacity shortfalls. The shortfalls and schemes required to meet demand are detailed in Table 6.3, funded by primarily through UKPN Capital Expenditure although network extensions to serve new development sites may be part funded by developers.

Table 6.3: Crossrail 2 capacity shortfall (based on existing demand) and required works

Borough	Substation	Capacity shortfall (MVA)	Works required	Budget cost
LB Enfield	Brimsdown South	10	Reinforcement in form of additional 132/11Kv transformer capacity and 11kV switchgear	£6.5m
	Ponders End	4	Reinforcement in form of additional 33/11Kv transformer capacity, 11kV switchgear and 33Kv circuits	£7.2m
	Central Edmonton	13	Reinforcement in form of additional 33/11Kv transformer capacity, 11kV switchgear and 33Kv circuits and associated Grid connection	£6.3m
LB Haringey	Bruce Grove	25		£5.8m
	Central Tottenham	3		£5.9m
	Tottenham	13	Reinforcement in form of additional 132/33kV transformer capacity, 33kV switchgear extension, 132kv underground circuit and connection at Tottenham Grid Supply Point	£4.8m
TOTAL		**68**		**£36.5m**

Source: UKPN

6.29 An alternative to reinforcing Bruce Grove and Central Edmonton is the creation of a new 33/11kV primary substation supplied from Palmers Green Grid. This will support development areas to the south of Enfield borough and the north of Haringey, with an estimated price of £7m excluding land.

6.30 The Tottenham Hotspur Stadium Redevelopment will require a connection to the Bruce Grove Primary Substation, leaving 40% spare capacity remaining.

6.31 These schemes will be put into National Grid's business plan and funded as part of their programme of capital expenditure works.

Waste and Energy / Heat from Waste

Current position - issues, opportunities and constraints

6.32 The Powerday facility at Brimsdown, Enfield was upgraded and opened in 2015, which has helped to significantly increase transfer station and recycling capacity in the local area in ULV. The £10 million facility provides equipment to deliver 100% recovery from 330,000 tonnes of waste per annum from construction, demolition, commercial and industrial sources.

Draft North London Waste Plan 2017-2032 (NLWP)

6.33 Seven north London boroughs (including the four in Upper Lee Valley – Enfield, Haringey, Hackney and Waltham Forest) collectively worked together to develop the North London

Waste Plan.[14] This is part of their Duty to Cooperate and needs to adhere to the Further Alterations to the London Plan (March 2015).

6.34 The emerging draft plan identifies the need for and provides the policy framework for the delivery of additional Resource Recovery Centres (modern waste recycling, collection and transfer facilities). Specifically a new Resource Recovery Facility (RRF) and an Energy from Waste (EfW) facility, both at Edmonton EcoPark. The development of these sites to provide such facilities has been assumed as part of the baseline within the plan's supporting evidence base. Within this evidence, the assessments have demonstrated that using the current London Plan predicted growth, there is still a gap between capacity and demand. The most recent update of this evidence base in July 2015 estimated a total gap of 21 hectares across all the different waste streams, with the largest gap associated with Landfill of Commercial and Industrial Waste (C&I) and Landfill of Excavation Waste (E). The identification of this gap has resulted in the consultation of potential sites and a call for sites, of which only one has come forward from perspective waste operators. The next stage is for the Examination in Public (EiP) of the draft plan.

6.35 Prior to the EiP, the seven north London boroughs should consider undertaking an assessment of the higher growth scenarios (with four-tracking and Crossrail 2) within the next data study update to inform the evidence base, as they have not yet been assessed. Although the additional growth may not increase the demand for space across all types of waste, it is likely that additional sites will be required. The waste market is such that it is expected that demand will drive the market to respond with the creation of suitable sites. This is easier for the local authority operated sites than privately operated due to the 25 year contract periods associated with local authorities.

Current schemes - timings and known costs

North London Heat and Power Project, Edmonton EcoPark

6.36 A Development Consent Order (DCO) is being sought to construct an EfW facility capable of an electrical output of around 70 megawatts (MWe), with associated development including a Resource Recovery Facility (RRF) with a capacity of 386,200 tonnes per annum. The proposed EfW facility will replace the EfW that exists on the same site by 2025 when the current facility is expected to reach the end of its operational life. The new facility will bring significantly improved efficiency and a capacity of 700,000 tonnes per annum. The EfW facility will also be capable of supplying heat and will link to the Lee Valley Heat Network.[15] The Inquiry is ongoing (May 2016) and the final decision is expected in early 2017.

6.37 The 15.26ha site is currently owned and managed by LWL, a private waste management company, wholly owned by and controlled by the North London Waste Authority. LWL is the freeholder of the Edmonton EcoPark and operator of the existing EfW facility. The current contract with the NLWA for management of its waste from 1.7 million households within the

[14] North London Boroughs, *Draft North London Waste Plan Regulation 18*, July, 2015, Draft on consultation

[15] North London Waste Authority, *Development Consent Order Application for North London Heath and Power Project*, 16 September, 2015

NLWA area[16] is due to expire in December 2025 with flexibility for termination sooner. The DCO application was submitted by LWL.

6.38 The site is designated as SIL and the existing waste facilities are safeguarded in LB Enfield's Core Strategy (Policy 14). The ULV OAPF supports the use and protection of the EcoPark as a waste management site, as this will help to meet north London's target to recycle 50% of all waste by 2020.

6.39 LB Enfield have worked to ensure that the detailed design of the EfW facility, specifically the arrangements for how/when the heat off-take occurs, provides the most efficient supply of energy and supports delivery of a viable LVHN, to deliver benefits to the wider area.[17]

6.40 There is a capacity gap for Energy from Waste development to manage Commercial and Industrial (C&I) wastes. As the existing EfW facility at Edmonton does not currently co-treat both waste streams in the same facility, four hectares of land is required to facilitate this provision.

Lee Valley Heat Network (LHVN)

6.41 Work is already underway to progress the delivery of a decentralised network in the Lee Valley, which is closely linked to the North London Heat and Power Project. The LVHN will capture affordable low carbon heat from EfW and CHP facilities and supply it to sites across the Lee Valley. The network which is the biggest of its kind in London will provide low carbon, low cost energy to 10,000 homes and more than 150 businesses across LB Enfield, Waltham Forest and Haringey, including Meridian Water and Blackhorse Lane.

6.42 The network will initially connect to the existing facility at Edmonton EcoPark but in the future will connect to the new EfW facility at Edmonton EcoPark and additional heat sources, including other EfW schemes.

LB Haringey Energy Masterplan[18]

6.43 LB Haringey have prepared an Energy Masterplan which sets out the priorities for LB Haringey in developing centralised heat supply infrastructure. These include the Tottenham Stadium as detailed in 3.13, with the long term view of connecting to the LVHN. Also recommended are schemes at Wood Green and Tottenham Hale. The viability of the schemes has been assessed and the funding gap (unspecified) is expected to be filled through a variety of funds including CIL, private sector investment and carbon offset funds. These may affect the viability of development schemes and will need to be considered by LB Haringey within the context of other planning obligations.

[16] "Draft Edmonton EcoPark Planning Brief (February 2013)", LB Enfield, accessed 25 April, 2016, **https://new.enfield.gov.uk/services/planning/planning-policy/supplementary-planning-documents/planning-policy-information-edmonton-ecopark-draft-planning-brief.pdf**

[17] LB Enfield, *Edmonton EcoPark Local Impact Report (ref: 16/01082/DCO),* April 2016

[18] LB Haringey, Energy Masterplan, January 2016

Funding of additional utilities infrastructure and works

6.44 Government sponsored private finance initiative credits are no longer available for waste facilities brought forward by private waste contractors and the NLWA. All new infrastructure will need to be funded by private commercial funding.

6.45 LB Enfield has approved a CIL Charging Schedule to aid infrastructure investment across the borough. If the Edmonton EcoPark planning application is determined after the adoption of the schedule, and the Charging Schedule applies to waste developments, payments will be charged at the rate specified.

6.46 Section 106 will additionally be sought for site specific mitigation issues in line with LB Enfield's adopted S106 SPG. If a CIL Charging Schedule is not in place by time of the DCO determination, a Section 106 will be used to ensure the provision of necessary infrastructure.[19]

Funding of Edmonton EfW facility

6.47 The NWLA have submitted a funding statement in support of the DCO which states: "The Applicant has assessed the viability of the Project as a means of meeting its statutory objectives and is confident that the Project would be viable (and would be funded) if development consent for the Project is granted." There is no detailed costing or funding information for this project that is publically available at the current time.

Funding of Lee Valley Heat Network

6.48 A strategic outline Business Plan has been prepared for the whole of the network, and a more detailed Business plan has been agreed by LB Enfield for Phase 1. These propose delivery of the LVHN to be through a local authority controlled company (LVHN Ltd). Set up as an 'arm's length' limited company with shares, so that it can attract private sector partners and funding, whilst retaining the option to take advantage of preferential loan rates and terms available to the public sector through the Public Works Loan Board (PWLB), the London Energy Efficiency Fund (LEEF), the EIB and the Green Investment Bank (GIB).

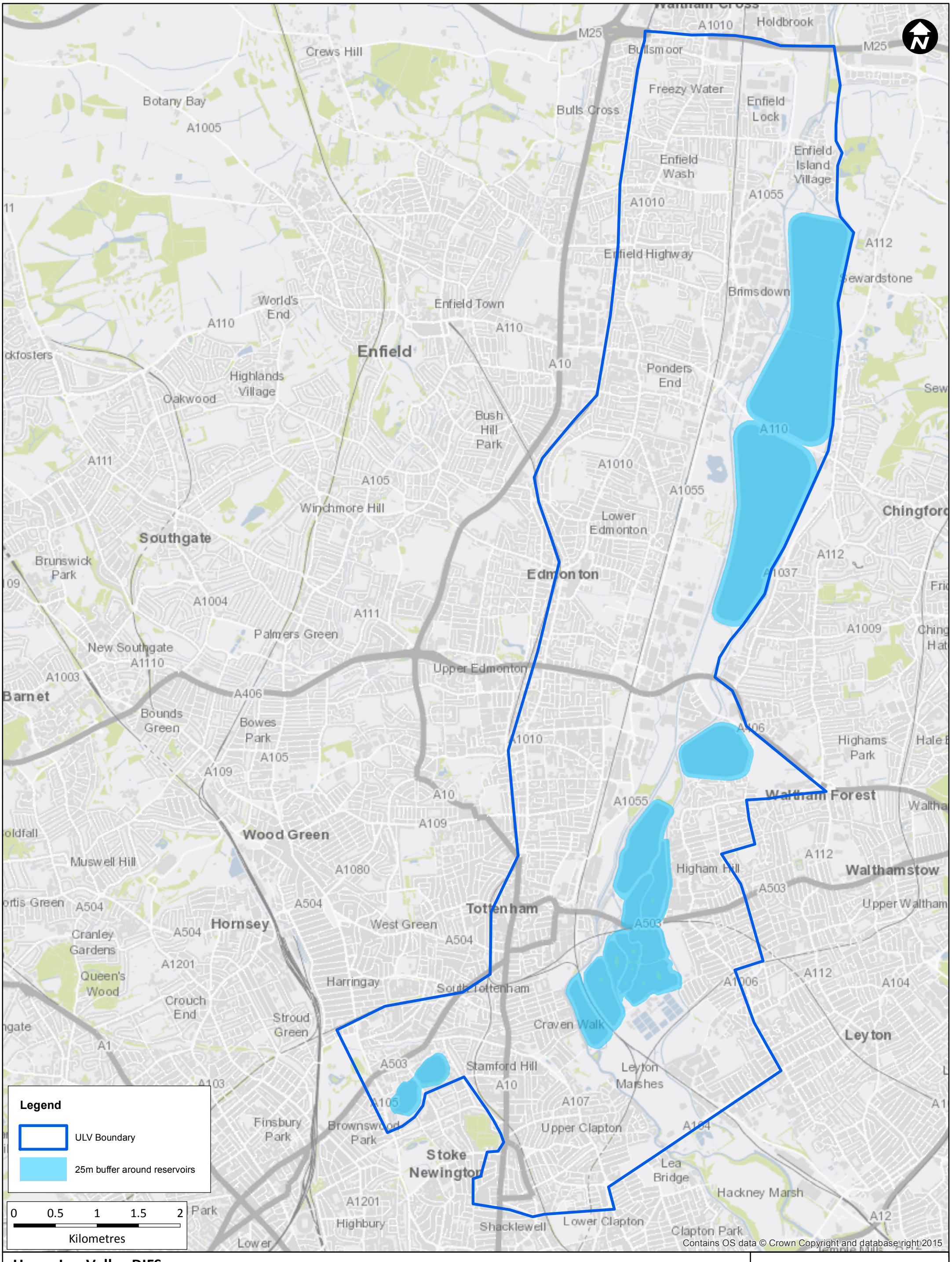
[19] "Draft Edmonton EcoPark Planning Brief (February 2013)", LB Enfield, accessed 25 April, 2016, **https://new.enfield.gov.uk/services/planning/planning-policy/supplementary-planning-documents/planning-policy-information-edmonton-ecopark-draft-planning-brief.pdf**

A Acronyms

Acronym	Definition
ALOM	Active-layer Open Model
BREEAM	Building Research Establishment Environmental Assessment Methodology
C&I	Commercial and Industrial
CD&E	Construction, Demolition and Excavation
CDA	Critical Drainage Area
CHP	Combined Heat and Power
CIL	Community Infrastructure Levy
DCO	Development Consent Order
DIFS	Development Infrastructure Funding Study
EA	Environment Agency
EfW	Energy from Waste
EIB	European Investment Bank
ERF	Energy Recovery Facility
FTTC	Fibre to the Cabinet
FTTP	Fibre to the Premises
FOI	Freedom of Information
GDN	Gas Distribution Network
GIB	Green Investment Bank
GLA	Greater London Authority
IDP	Infrastructure Delivery Plan
IGT	Independent Gas Transporters
IWMP	Integrated Water Management Plan
LACW	Local Authority Collected Waste
LDZ	Local Distribution Zone
LEEF	London Energy Efficiency Fund
LVHN	Lee Valley Heat Network
MDU	Multi Dwelling Unit
NGA	Next Generation Access
NLWA	North London Waste Authority
NLWP	North London Waste Plan
NP	Network Provider
NSIP	Nationally Significant Infrastructure Project

NTS	National Transmission System
OA	Opportunity Area
OAPF	Opportunity Area Planning Framework
PCP	Primary Connection Point
PIP	Physical Infrastructure Provider
PLOM	Passive-layer Open Model
PWLB	Public Works Loan Board
ROI	Return on Investment
RRF	Resource Recovery Facility
SDAC	Sewerage Drainage Area Catchment
SDC	Sustainable Design and Construction
SFRA	Strategic Flood Risk Assessment
SIL	Strategic Industrial Land
SME	Small and Medium Enterprise
SP	Service Provider
SPD	Supplementary Planning Document
SPG	Supplementary Planning Guidance
STW	Sewage Treatment Works
SUDS	Sustainable Urban Drainage System
SWMP	Surface Water Management Plan
TfL	Transport for London
UIP	Utility Infrastructure Providers
UKPN	UK Power Networks
ULV	Upper Lee Valley
WRMP	Water Resources Management Plan
WRZ	Water Resource Zone
3LOM	Three-layer Open Model

B Thames Water Development Exclusion - Reservoirs



Upper Lee Valley DIFS

Appendix B: Exclusion zone policy related to Thames Water Reservoirs (25m)

steer davies gleave

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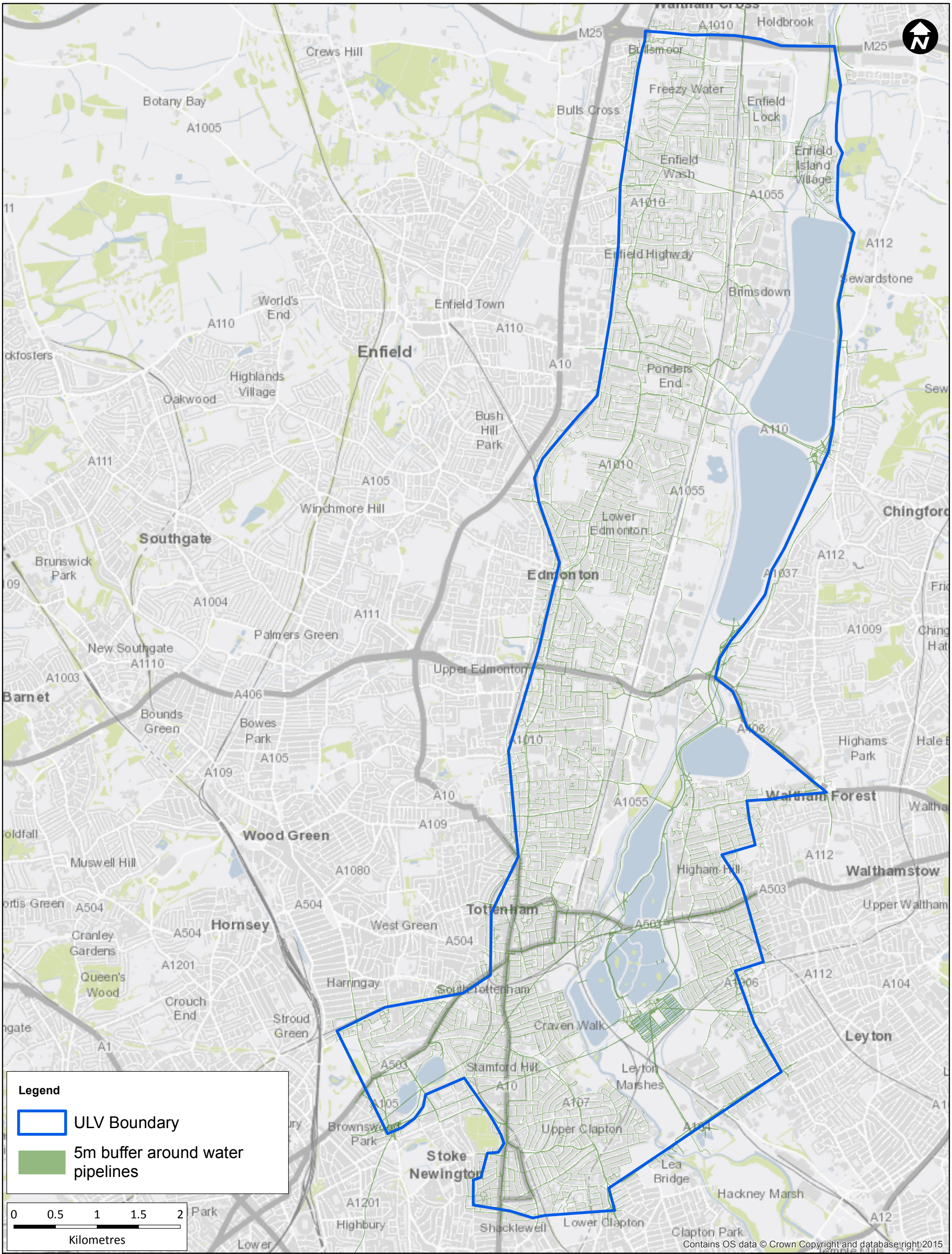
C Thames Water Development Exclusion – Strategic trunk mains



Upper Lee Valley DIFS

Appendix C: Exclusion zone policy related to Thames Water Pipelines (5m)

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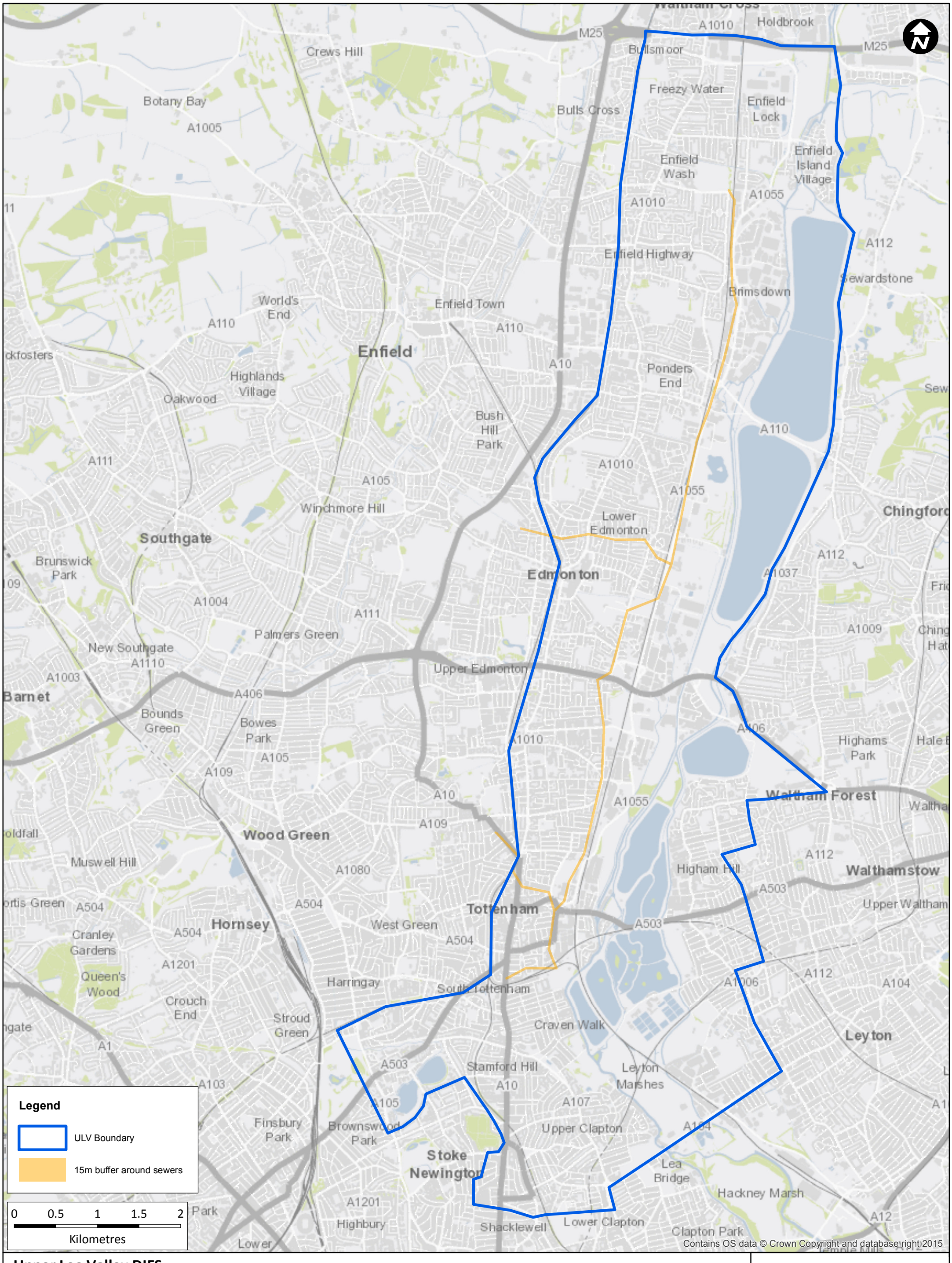
D Thames Water Development Exclusion zones – Sewage Pipes



Upper Lee Valley DIFS

Appendix D: Exclusion zone policy related to Thames Water Sewers (15m)

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E Potential issues of water companies' charging framework – Ofwat review

Issue	Description
1) Administrative burden	For larger developments, the water companies often carry out complex calculations to estimate the costs of providing the requisitioned main. Significant variation between companies exists in how they apply the charging framework. As a result, this creates a lot of work for all parties, as well as for Ofwat as we are frequently asked to determine disputes over these calculations. There is also a requirement for the calculations to be redone once the actual costs of providing the requisitioned main/sewer or connection are known, creating additional administrative burden on both parties. This process causes concerns for developers as the actual costs may be significantly different from the estimated costs. And it provides little incentive for the water and/or wastewater company to provide accurate estimates as they are able to recover the actual costs regardless of the accuracy of their estimate.
2) Risk of double-charging	Through requisition charges, water companies can recover the costs that are reasonably incurred in providing a new water main, public sewer or lateral drain, including costs associated with certain off-site network reinforcement. They can also collect infrastructure charges from each premises connected to the network for the first time, which are designed to contribute to the costs of existing network reinforcement. Developers are therefore concerned that this may result in water companies double-charging for network reinforcement costs.
3) Unclear incentives to self-lay and potential barriers to competition	If a developer chooses to self-lay a water main, (in most cases) they must pay a self-lay charge to the water company. This is supposed to cover the costs associated with incorporating the new pipework to the company's assets. However, it appears that there are differences between water companies over what costs are recovered through self-lay charges. Self-lay organisations are concerned that this puts them at a competitive disadvantage compared with the incumbent doing the work themselves. In addition, the water company will make an asset payment to the self-lay organisation to compensate them for the costs of the asset, which the water company will then adopt. This is only available for water mains and not sewers, which creates concerns over the existence of a level playing field
4) A 'first mover' disadvantage	In areas of new development, the first developer will often pay the costs associated with connecting the new area to the existing public mains/sewers. Subsequent developments in the new area can connect into these new mains/sewers and therefore may avoid the costs associated with connecting the area to the public mains/sewer. Also, when works are provided that serve more than one development, there are differences between water and/or wastewater providers in the approach taken to share the costs between customers.
5) Arbitrary calculations	When requisitioning a new main/sewer, the charge to the developer is based on a complex calculation of a 12-year loan to cover the costs of providing the main/sewer, which is offset by the income generated by the premises connected to the main/sewer. This results in the costs being heavily dependent on the rate at which the new premises are built and connected. Similarly, asset payments are only made for self-laid water mains but not for self-laid sewers, with little clear economic rationale why this is the case.

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6) Weak price signals	Infrastructure charges are fixed for the entire company area are essentially fixed at the same level across England and Wales. Therefore, they provide weak price signals to encourage developers to build in areas where there is existing network capacity.
7) Lack of transparency	It is not clear to most developers what exactly they are paying for in the charges they are asked to pay. This is especially true of infrastructure charges, which are the same across the entire sector and not directly attributable to specific works arising from an individual development. In addition to this, water companies interpret the existing legislation differently, leading to companies having different approaches to what costs they will or will not include in the charges they require of developers. This has resulted in a lack of confidence in these charges, especially where they appear to be significantly different to the levels of charges made to connect other utilities.
8) Interactions with planning framework	Developers have raised concerns that some water companies are using the statutory planning framework as a way to make developers fund works to reinforce the existing network. Water companies are often asked by a local planning authority (LPA) to review the potential impacts of a new development on existing customers, in particular to help understand and mitigate any potential flood risk. Where there are concerns that a development would adversely impact existing customers, these companies may be able to suggest that the LPA place a condition on the developer's planning consent to address any particular concerns (or pay the company to do this work) before planning permission is granted. This is not an activity that Ofwat regulates through the WIA91. But the fact that some water companies are pursuing this route to recover costs associated with new connection may indicate a failure of the current framework.
9) Investment ahead of need	Water companies have raised concerns about how effective the existing framework is in allowing them to invest in reinforcement works ahead of expected future developments. In many cases, a forward-looking plan of investments can be more efficient than a piecemeal approach that is reactive to each individual development as it occurs. While the existing framework does not explicitly prevent water companies from doing this, there is still some reluctance in the sector to pursue this option. This may be because of distributional concerns about whether the costs for this work are recovered from developers or from bill payers.
10) Predictability of charges	A number of stakeholders have identified the predictability of charges as being highly beneficial to developers, as it enables them to take account of the costs more effectively when purchasing available land, and constructing the developments.

F Virgin Media network route in context of ULV

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Virgin media

CHINGFORD

WALTHAM FOREST LONDON BORO

WALTHAMSTOW

LEYTON

WANSTEAD

WALT HUB

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— ULV BOUNDARY

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