Local Development Framework

SUBMISSION DOCUMENT
CORE EVIDENCE BASE
Public Transport Capacity Assessment

Improving the quality of life for everyone living and working in the Borough

November 2006
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1 Public Transport Study

1.1 Introduction

This report has been prepared by Buro Happold to inform the preparation of Local Development Framework, specifically the Area Action Plans (AAPs) for the London Borough of Tower Hamlets.

A transport baseline report was produced by Buro Happold in spring 2005. This provided an initial analysis of the constraints and opportunities of the transport infrastructure within the Borough.

This report takes the process further by considering the likely trip generation and overall accessibility of the AAP areas. The Borough is divided into four AAP areas, these are:

- Leaside
- City Fringe;
- Isle of Dogs; and
- Central.

The location of the four AAP areas within Tower Hamlets is shown on Figure 1.

For the purposes of this study non-public transport trips and in particular car trips have been excluded. It is assumed car use generated by the new developments in the AAP areas would be accommodated within the network. This is based on the assumption that the highway network is already congested and people wishing to drive would either put up with the prevailing conditions or change their travel behaviour.

The four AAPs provide guidelines up to 2020 for the future release of development within the Borough. This report reviews the transport implications for three future year scenarios:

- Developments proposed between 2006 and 2010
- Developments proposed between 2011 and 2015
- Developments proposed between 2016 and 2020.
Figure 1 – The Four AAP areas in Tower Hamlets
1.2 Methodology

The aim of this report is to establish an understanding of the quantity/quantum of development that could be introduced within the Borough; and the resulting impact this would have on the surrounding transport infrastructure. The delivery of development will occur over a prolonged timeframe so upgrades to the transport infrastructure over this period have been identified and taken into consideration.

The transport study has been based on the quantity and type development forecast by EDAW. The assessment is qualitative rather than quantitative in transport modelling terms. It is advisable for Tower Hamlets to undertake a robust quantitative assessment of a transport model to evaluate the impact of London wide developments on the transport infrastructure serving the Borough. The qualitative approach adopted provides a robust assessment. It will enable development phasing problems and potential shortfalls in transport infrastructure to be flagged up for each of the AAP areas.

A travel demand assessment has been undertaken to identify any shortfalls in infrastructure. The broad principles behind this methodology are to forecast the number of trips that the development proposals will generate and assign these to the transport network. The effect of these additional trips is then expressed in terms of capacity thus allowing any shortfalls to be assessed.

1.2.1 Travel Demand Analysis

The travel demand analysis entails estimating supply and demand.

The requirements for estimating demand are to:

- develop peak hour trip rates for each land-use (residential, commercial, industrial, retail/leisure, community), using data from other London developments;
- estimate modal splits using data from previous reports and data obtained from a GIS spatial analysis of the developments proximity to public transport nodes;
- calculate the number of trips generated by each site based upon the Gross Floor Area (GFA) and then apply the modal split to produce the number of person trips generated by each development per mode of transport; and
- assign the direction of travel to the development trips generated using data from previous reports, and from the National 2001 census data.

The requirements for estimating supply are to:

- Collate line loading data and estimate the existing capacity/residual capacity for each corridor/line of transport.
The travel demand assessment was undertaken using a spreadsheet model. The spreadsheet and all of the key assumptions are shown in Appendix A. The key inputs to this were:

- the development area schedule, arranged by AAP, land-use and development delivery year;
- the spatial assessment of each development’s proximity to public transport nodes;
- peak hour trip rates for each of the aforementioned land-uses; and
- direction of travel and modal split.

The main outputs are the number of person trips made by direction and by mode for each development area.

The following should be noted and taken into consideration when reviewing the results of the travel demand work:

- It has not been possible to identify the quantum and type of existing development contained on each of the sites identified for development. Ideally, existing trips would be factored into the travel demand thus allowing the net increase in trips to be estimated. Consequently the travel demand forecast will tend to overestimate the actual increase in trips. However, it is possible that some of these sites are brownfield or maybe occupied by an industrial land-use. This type of land-use generates a relatively low number of person trips during peak hours hence will have a negligible effect on the outcome of this exercise.
- Existing patronage levels on public transport services have been adjusted for future scenarios in-line with current forecasts. One of the most significant factors that affect these forecasts is the delivery on new future development. There is hence an element of double-counting inherent in this process.
- The trips generated during construction have not been considered in the travel demand analysis.
- Supply data has been taken from existing sources of information and published reports. No new data collection has been undertaken.
- The travel demand model represents a simplified approach and calculates ‘external’ trips. It does not account for internal/linked trips that may occur within mixed-use developments e.g. someone who may live and work within a single development. In addition the model does not account for complex trips which could involve a number of different changes between lines and/or modes.

1.3 Base Assumptions

The following base assumptions have been made in undertaking the analysis described in the previous section:
• The AM peak hour represents the worst case in terms of the number of people moving around and available transport capacity on the network in the Borough and beyond. As a result this report deals only with AM peak hour trips

• Bus services in London have been significantly improved in recent years. It is assumed that the bus network will respond to additional demand through service capacity enhancements. This report makes reference to the percentage of total bus capacity that development sites identified in the AAPs will require. Where possible, enhancements to bus services that maybe required have been identified

• It is assumed all developments will be accompanied by a travel plan setting out ways in which non car modes can be promoted. This should also set out the public transport opportunities available

• It is assumed each development will make a contribution towards transport and access improvements. This could be ring-fenced to fund station upgrades, strategic pedestrian and cycle routes, new bus services, bus stop infrastructure etc

• New and proposed developments outside of the Tower Hamlets Borough boundary have not directly been accounted for. To overcome this, growth factors for usage of each of the public transport modes have been calculated and included in our analysis. The growth factors take account of rising future demand, for example, the increased patronage on the DLR associated with the Royal Docks development and on the Jubilee and Central lines associated with the Stratford City development

• The extra trips generated by the predicted windfall housing within the Borough have been excluded from the travel demand analysis as no information was available as to the locations of these developments. However sensitivity tests to compare the Borough-wide public transport network with and without the windfall housing has been carried out, the results of this analysis can be found in Appendix G. The additional windfall housing translates to an increase of between 135,000 and 165,000 s qm of residential GFA. The additional trips generated by this increase have a negligible impact upon the Borough-wide capacity assessment

• It is assumed that Crossrail will be implemented by 2016.
2 Development Areas

2.1 Introduction

This section of the report:

- discusses the proposed development land-uses by AAP area and by development phasing; and
- reviews the methodology and results of the trips generated by the proposed developments.

2.2 Proposed land-uses

The aforementioned travel demand analysis has been based upon the quantum and type of land-use proposed. Detailed predictions of future development have been generated by EDAW outlining the amount of development proposed between 2006 and 2020 in each of the four AAP areas. This has been undertaken for scenarios which consider high and low residential density options.

In order to clarify the base data used for the travel demand assessment the proposed land-use schedule for each AAP area is shown in Appendix A. In summary, Table 1 below highlights the total land-use GFAs for each of the development years, for both the high and low residential density options.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low Residential (GFA in m²)</td>
<td>High Residential (GFA in m²)</td>
<td>Low Residential (GFA in m²)</td>
<td>High Residential (GFA in m²)</td>
</tr>
<tr>
<td>Industrial</td>
<td>25,770</td>
<td>25,770</td>
<td>342,967</td>
<td>342,967</td>
</tr>
<tr>
<td>Commercial</td>
<td>498,727</td>
<td>498,727</td>
<td>621,208</td>
<td>621,208</td>
</tr>
<tr>
<td>Retail/Leisure</td>
<td>101,564</td>
<td>101,564</td>
<td>73,713</td>
<td>73,713</td>
</tr>
<tr>
<td>Community</td>
<td>42,368</td>
<td>42,368</td>
<td>53,875</td>
<td>53,875</td>
</tr>
<tr>
<td>Residential</td>
<td>889,573</td>
<td>1,011,191</td>
<td>1,069,446</td>
<td>1,257,567</td>
</tr>
<tr>
<td>Total</td>
<td>1,558,002</td>
<td>1,679,621</td>
<td>2,161,208</td>
<td>2,349,329</td>
</tr>
</tbody>
</table>

GFA Values not including Windfall Housing

2.3 Trips generated by development

The trips generated by each development have been calculated using trip rate, modal split and directional split data.

A GIS spatial model of Tower Hamlets was used to refine the AAP area wide modal splits and generate site specific estimates. This has been determined based upon the availability and proximity of public transport at each site and the directions of travel provided for. The table below illustrates how, rail services accessible from stations within a 940 metre walk catchment of each site were considered by this exercise.
Table 2 – Extract from trip generation spreadsheet, showing an example of the walking distances to nearest public transport station

<table>
<thead>
<tr>
<th>Site ID</th>
<th>Site Name / Address</th>
<th>Distance (m)</th>
<th>Station</th>
<th>Distance (m)</th>
<th>Station</th>
<th>Distance (m)</th>
<th>Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF12.B</td>
<td>Aldgate Gyratory mixed</td>
<td>470</td>
<td>Fenchurch Street</td>
<td></td>
<td></td>
<td>470</td>
<td>Aldgate East</td>
</tr>
<tr>
<td>ID7</td>
<td>Skylines Harbour</td>
<td>2341</td>
<td>Limehouse</td>
<td>500</td>
<td>Cross Harbour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CF12.A</td>
<td>Goodmans Fields</td>
<td>635</td>
<td>Fenchurch Street</td>
<td>183</td>
<td></td>
<td>183</td>
<td>Tower Gateway</td>
</tr>
<tr>
<td>ID32</td>
<td>Columbus House</td>
<td>1186</td>
<td>Limehouse</td>
<td>600</td>
<td>Westferry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LS3</td>
<td>Central Fish Island</td>
<td>208</td>
<td>Hackney Wick</td>
<td>1162</td>
<td>Bow Church</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CF4</td>
<td>Nicholson Clarke - Fleur de Lis Street</td>
<td>256</td>
<td>Aldgate East</td>
<td>752</td>
<td>Tower Gateway</td>
<td></td>
<td></td>
</tr>
<tr>
<td>119</td>
<td>Sites between Brodlove Lane / The Highway / Limehouse</td>
<td>191</td>
<td>Shadwell</td>
<td>644</td>
<td>Limehouse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ID47</td>
<td>Harbour Exchange Square</td>
<td>2201</td>
<td>Limehouse</td>
<td>392</td>
<td>South Quay</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CF9</td>
<td>Middlesex Street Rodwell House</td>
<td>225</td>
<td>Aldgate East</td>
<td>360</td>
<td>Tower Gateway</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ID12</td>
<td>Heron Quays</td>
<td>1450</td>
<td>Limehouse</td>
<td>312</td>
<td>Heron Quays</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Distance to PT station

Table 3 provides a snapshot of the proposed developments ranked in descending order, which generate the highest number of person trips. A complete set of trip generation results ranked in descending order for the High Density residential option are available in Appendix B.

Table 3 – In descending order the highest trip generating developments
(high residential option – includes PT and Non PT trips)

<table>
<thead>
<tr>
<th>Site ID</th>
<th>Site Name / Address</th>
<th>Site Area</th>
<th>Date of Build Out</th>
<th>Person trips</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID1</td>
<td>North Quay</td>
<td>21,214</td>
<td>2016-2020</td>
<td>7,072</td>
</tr>
<tr>
<td>ID2</td>
<td>Billingsgate Market</td>
<td>57,181</td>
<td>2016-2020</td>
<td>2,816</td>
</tr>
<tr>
<td>ID5</td>
<td>Wood Wharf</td>
<td>72,666</td>
<td>2011-2015</td>
<td>2,353</td>
</tr>
<tr>
<td>ID38</td>
<td>Canary Riverside</td>
<td>19,867</td>
<td>2006-2010</td>
<td>2,356</td>
</tr>
<tr>
<td>IDN12</td>
<td>10 &amp; 20 Churchill Place</td>
<td>4,528</td>
<td>2006-2010</td>
<td>2,193</td>
</tr>
<tr>
<td>LS12</td>
<td>Empson Street / St Andrews Way</td>
<td>100,717</td>
<td>2011-2015</td>
<td>1,798</td>
</tr>
<tr>
<td>CF21</td>
<td>News International</td>
<td>71,593</td>
<td>2011-2015</td>
<td>1,003</td>
</tr>
<tr>
<td>LS4</td>
<td>South Fish Island</td>
<td>135,843</td>
<td>2011-2015</td>
<td>1,637</td>
</tr>
<tr>
<td>IDN10</td>
<td>15 Canada Square</td>
<td>7,222</td>
<td>2006-2010</td>
<td>978</td>
</tr>
<tr>
<td>CF9</td>
<td>Brushfield Street Wool Exchange</td>
<td>9,743</td>
<td>2011-2015</td>
<td>906</td>
</tr>
</tbody>
</table>

A full set of trip generation results, sorted by AAP area and mode of transport are available in Appendix B.
3 Borough-wide public transport analysis

3.1 Introduction

This section of the report:

- highlights the existing public transport modes and services that serve the Borough;
- provides an analysis on the public transport accessibility level (PTAL) for the proposed development areas, with the intention of identifying the development areas that are not well served by public transport;
- reviews the existing loading and residual capacity for each public transport mode and identifies the possible capacity shortfalls;
- identifies proposed major public transport network upgrades between 2006 and 2020 and the additional capacity these will provide; and
- provides a capacity analysis for each of the development year scenarios on a mode by mode, line by line basis and flags up problem areas for discussion.

3.2 Existing public transport

The Borough is currently served by the London Underground, Docklands Light Railway (DLR), overland rail and London buses. A figure highlighting the development areas in the context of the rail services and stations within the Borough is shown in Appendix C. A figure showing bus routes can also be found in Appendix C.

The London Underground services that operate within the Borough include the District, East London, Hammersmith & City, Central and Jubilee lines. The majority of these lines operate along an east-west axis, apart from the East London line which operates along a north-south axis.

The DLR services that operate within the Borough include the east-west, Canning Town-Bank branches; and the north-south, Stratford-Lewisham branches.

The overland rail services, One Railway and C2C operate out of Liverpool Street station and Fenchurch Street station respectively. One Railway serves the east of England and C2C serves the area east of London. The Silverlink Country & Metro line clips the north-eastern corner of the Borough and the only station within the Borough served by this line is Hackney Wick.

London buses operating throughout the Borough are fairly comprehensive and the key corridors into/out of the City operate along Mile End Road, Commercial Road and Roman Road.
River Services utilising the River Thames operate on two routes, to/from Woolwich and Central London. Within the Borough the service stops at the Canary Wharf Pier and the Masthouse Terrace Pier and operates with a peak hour capacity of approximately 400 passengers.

In general, the majority of public transport corridors that serve the Borough operate along the east-west axis; this excludes some DLR and Bus services. The central London rail termini of Liverpool Street and Fenchurch Street are located on the western fringe of the Borough. On the eastern fringes outside of the Borough are the key transport nodes of Stratford and Canning Town.

3.3 Development accessibility (PTAL analysis)

The public transport accessibility level (PTAL) methodology has been adopted by Transport for London and the Greater London Authority as a means of comparing site accessibility by public transport. Using the methodology the accessibility of a site is valued by taking account of the time taken to access the public transport network, including walk time to the various services, the average waiting time and frequency of service and the reliability of each service.

LBTH have provided PTAL values for each of the development sites in the four AAP areas. These are available in Appendix D. The calculated PTAL values for each development site have been interrogated for the existing provision of public transport. The results have been split into the following categories:

<table>
<thead>
<tr>
<th>PTAL</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>1a - 2</td>
</tr>
<tr>
<td>Medium</td>
<td>3 - 4</td>
</tr>
<tr>
<td>High</td>
<td>5 - 6</td>
</tr>
</tbody>
</table>

A statistical review of the PTAL values reveals that 11% of the proposed developments have a 'low' PTAL value, 15% have a 'medium' PTAL value and the remaining 64% have a 'high' PTAL value. Figure 2 below summarises the PTAL values (note each development with the same value has been grouped to provide a Borough-wide breakdown).
In general, the vast majority of sites are well served by public transport. The London Plan (2004) does not provide guidance to major development being linked to defined PTAL scores, however, the Draft Further Alterations to the London Plan state that major new development should be located in areas with high public transport accessibility (interpreted as PTAL scores of 4 to 6). The PTAL results indicate that 23% of the proposed developments would rank below the recommended value, based upon existing public transport provision. Figure 3, below, identifies the sites that fall below this criteria and into the ‘1, 2 or 3’ PTAL value bracket. In summary for each of the AAP areas is provided below:

- **Leaside APP** - the area immediately to the south of Hackney Wick station; the area to the east between Devons Road and All Saints DLR stations; and the area to the south of Canning Town are all areas with low accessibility. From a development point of view these areas are less likely to be supported for major developments based on the existing PTAL value.

- **City Fringe AAP** - all of the development sites have acceptable PTAL values.

- **Isle of Dogs APP** - the area to the west of Cross Harbour, Mudchute and Island Gardens DLR stations are areas with low accessibility.

- **Central AAP** - the area east of Cambridge North and north of Mile End are areas with low accessibility.
3.4 Existing public transport usage

Two methods of assessing the effect of future development on the public transport network have been developed. The first of these has been applied to London Underground and DLR services for which comprehensive patronage data is available. This allows reliable estimates of existing passenger loadings to be made. The second approach has been applied to modes where patronage data is not available i.e. overground rail and bus services. In the case of overground rail services, passenger data is commercially sensitive and is hence very difficult to obtain from operators. In contrast to this, London Buses hold very detailed information on bus loadings. It has not been possible within the scope of this study to undertake the considerable analysis required to determine bus service ridership levels within the Borough. The approach taken to assess the effect on rail and bus services has therefore been to relate demand to total line capacity.
Underground services have been assessed on the basis of maximum observed crush capacity. This provides a more realistic estimate of the number passengers that may be accommodated than the planning standard capacity. To simplify the interpretation of crowding levels on Underground and DLR services the concept of a volume to capacity ratio (VCR) has been adopted. The VCR levels that have been adopted are as follows:

- 0.5 – 0.65 represents moderate crowding (and provides the benchmark for the planning capacity standard);
- 0.65 – 1.0 represents high levels of crowding; and
- > 1.0 represents very high levels of crowding.

A full set of results for the existing capacity are available for review in Appendix E. A summary of the results on a mode by mode basis are described below.

In addition to analysing line capacity, capacities of London Underground Ltd. (LUL) stations within the Borough have also been reviewed. The commentary for this exercise is located within chapter 3.6.2 of this report.

### 3.4.1 LUL

The existing capacity on LUL lines within the Borough is generally adequate, with the majority of lines running at low to moderate crowding, so below the planning standard requirement. The exceptions to this are on the Central and District line westbound services, where some sections of the lines are experiencing high levels of crowding between Mile End and Bank.

Forecast future passenger growth for LUL has been assumed at 0.48% per annum, this equates to a 7% increase in the AM peak hour between 2006 and 2020 (sourced from LUL strategic planning department).

### 3.4.2 Rail

The two rail services operating within the Borough and beyond are already running at high to very high levels of crowding compared to their available capacity. However, unlike on the LUL analysis this capacity is calculated relative to the number of seats on a service, rather than a crush capacity, so extra capacity should still be available for standing passengers.

Forecast future passenger growth for Rail has been assumed at 0.48% per annum, this equates to a 7% increase in the AM peak hour between 2006 and 2020.

### 3.4.3 DLR

The DLR is currently running within capacity, with almost no services experiencing even moderate levels of crowding. With line extensions and extra services scheduled in the near future, growth forecasts for its use are high (45% in the next 4 years); however, it is thought a large proportion of this increase will occur outside of the peak hours.
Forecast future passenger growth for DLR has been assumed at 0.7% per annum, this equates to a 10% increase in the AM peak hour between 2006 and 2020 (Sourced from TfL).

3.4.4   London Bus

Bus provision in Tower Hamlets is comprehensive. Within the scope of this study it has not been possible to establish existing patterns of usage for each of the bus routes that serve the Borough.

Forecast future passenger growth for London Bus use has been assumed at 1% per annum, this equates to a 21% increase in the AM peak hour between 2006 and 2020 (Sourced London Travel Report 2004).

3.5   Proposed upgrades

Between 2006 and 2020, a number of significant public transport infrastructure projects are planned, which will improve public transport corridors within Tower Hamlets. Table 5 below summarises these and their likely implementation dates. All of the improvements have been factored into the travel demand analysis for the future year scenarios of 2010, 2015 and 2020. The key headlines from the table identify that by 2011 significant capacity enhancements will have occurred to LUL and DLR services. The largest contribution will be the introduction of the Crossrail project, estimated for implementation by 2016.
<table>
<thead>
<tr>
<th>Line</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Line</td>
<td>Increased peak hour east bound service to 27 tph</td>
</tr>
<tr>
<td>Stratford</td>
<td>Increased peak hour east bound service to 28 tph</td>
</tr>
<tr>
<td>Mile end</td>
<td>Stratford International station opens</td>
</tr>
<tr>
<td>Liverpool street</td>
<td>Station modernisation and refurbishment</td>
</tr>
<tr>
<td>Jubilee Line</td>
<td>Increased peak hour service 30 tph</td>
</tr>
<tr>
<td>West ham</td>
<td>Capacity increased by 49%</td>
</tr>
<tr>
<td>Canary wharf</td>
<td>Station upgrade</td>
</tr>
<tr>
<td>Canada water</td>
<td>Increased peak hour services, east bound</td>
</tr>
<tr>
<td>District Line</td>
<td>Increased peak hour services, east bound</td>
</tr>
<tr>
<td>Bromley by bow</td>
<td>Improved signaling</td>
</tr>
<tr>
<td>Bow road</td>
<td>Increased peak hour services, east bound</td>
</tr>
<tr>
<td>Stepney green</td>
<td>Improved signaling</td>
</tr>
<tr>
<td>Whitechapel</td>
<td>Improved signaling</td>
</tr>
<tr>
<td>Aldgate East</td>
<td>Probable increased peak hour services</td>
</tr>
<tr>
<td>Mile end</td>
<td>Increased peak hour service 12 tph</td>
</tr>
<tr>
<td>Shadwell</td>
<td>Increased peak hour service 16 tph</td>
</tr>
<tr>
<td>North - South</td>
<td>Bank - Lewisham capacity increase 2 - 3 car trains</td>
</tr>
<tr>
<td>Pudding mill lane</td>
<td>2 - car trains (increased capacity by 50%)</td>
</tr>
<tr>
<td>All saints</td>
<td>Opening of the Crossrail line, provides a line capacity of 36,000</td>
</tr>
</tbody>
</table>

**Table 4 – Proposed upgrades and Implementation dates**