London Borough of Ealing

West London Tram – Economic Development and Regeneration Potential

Final Report

37100

May 2006

Llewelyn Davies Yeang

llewelyn davies yeang
architecture
planning
design

Contents

List of Tables

List of Figures

1 Introduction

Earlier work by Llewelyn Davies Yeang[1] to prepare the Ealing Business Case for the West London Tram made reference to the potential for the tram to open up options for higher intensity development in the town centres and along the Uxbridge Road corridor, and to enable this increased intensity without impeding efforts to improve environmental quality.

The present report explores these aspects further and provides a quantified estimate of development potential, as well as a commentary on less quantifiable but nevertheless important aspects.

The issues explored in this report include:

- Identification of sites where development potential might be realised as a response to the tram, and the quantity of additional dwellings and/or jobs that could be achieved within 10 years in the five town centres, at employment locations, and in the corridor generally;
- Features of the proposed tram that can create development potential;
- The extra jobs that could be supported and their relationship to the deprived wards along the corridor;
- The ability of the tram to handle the extra patronage that would result from the additional development;
- The likelihood of such additional patronage being attracted or handled without the tram.

[1] "West London Tram: Ealing Council Business Case", Llewelyn Davies Yeang, for LB Ealing, April 2005

2 Summary of findings

- The existing Developing Briefs for sites within the corridor identified by LB Ealing mostly propose for development at densities and uses that maximise the accessibility of the corridor, consistent both with the character of the locality and planning policy;
- This thorough and consistent exploration by LB Ealing of sites with short term development prospects has meant that the additional development potential identified in this study is perhaps lower than might have been expected, based on urban capacity studies undertaken elsewhere;
- Nevertheless, Additional sites with potential for residential or other development have been identified as part of this study. Combined with the sites identified by LB Ealing, the corridor offers potential for an increase in jobs of 24% and an increase in dwellings of 14%, in both cases above assumed 2006 levels. These levels are well above the general London Plan growth levels of 11% jobs and 8% dwellings. This means that the WLT corridor in Ealing could enable a higher proportion of growth to be focused on public transport in a policy-consistent way;
- Roughly 30% of the job growth potential is on sites identified in this study additional to those already identified by LB Ealing. About 40% of the residential potential is on sites identified in this study.
- The growth potential identified in the WLT corridor provides for the concentration of growth in a way that promotes policy objectives for reduced car dependence, more public transport use and social inclusion;
- At the same time, concentration of growth in the WLT corridor reduces pressure for high intensity development on less suitable (less accessible) locations elsewhere in the Borough;
- Development in the WLT corridor does not in general mean more trips overall, but an important distribution of trip growth that favours public transport and support of town centres;
- The trips generated by these additional homes and jobs could mostly be accommodated by the proposed tram service offering peak one-way capacity of 6,000 passengers per hour. This level of service would be provided by a 3 minute interval service of trams with a capacity of 300 passengers;
- Demand could be 10% in excess of this capacity for a limited section between Northfield Avenue and Ealing Broadway for one hour in the morning peak. This could be met by accepting short term increases in tram loading of 320 rather than 300.
- The identified level of growth could not readily be accommodated by bus services. Over the busiest section towards Ealing Broadway, bus capacity would have to be enhanced to over 3,500 per hour. There could be a capacity shortfall at peak times, and difficulties in maintaining service regularity as frequencies are increased to 25 per hour per direction or more.
- Consequently the tram will support a higher growth in the number of jobs and homes than would be the case with buses, and thus would be likely to stimulate development interest to enable this to be realised.

3 Method and assumptions used

The study examines the proposition that the West London Tram will enable more intensive development to occur in the Uxbridge Road corridor, and will encourage such growth in the medium to long term following the go-ahead for the tram. Sites have been identified where development could occur leading to a growth in homes and jobs in the tram corridor. Model outputs of tram patronage levels produced for Transport for London[2] have been used to assess the ability of the tram to handle trip growth arising from such additional development.

The method consisted of the following key stages:

1 Review of sites within catchments

LB Ealing has already identified a large number of sites. An assessment of additional development potential on sites within 700 metre stop catchments was carried out.[3] This involved site visits and consultation of LB Ealing documents and staff. The outputs were based on density criteria including land use and accessibility factors, in line with London Plan policy.

Output: jobs and dwellings capacity of LB Ealing identified sites and potential additional sites.

2 Assessment of the trips that would be generated by further development.

This is a broad brush assessment based on cautious assumptions. The method of calculation of the number of trips generated is described in section 3.2. The resulting trips were then added to the forecast trip levels in Run 60b of the model produced for Transport for London. The trips resulting from the identified development sites were estimated in two ways. The first was based on a percentage increase in homes and jobs, leading to an equivalent percentage increase in the forecast trips for each section of the tram route in Ealing. The second made a number of assumptions regarding the length and distribution of trips along the corridor and the mode split of journeys, especially to work. This exercise focused on the section of route where forecast demand is highest in the morning peak hour, namely Hanwell to Ealing Broadway.

Output: Peak am trips generated/attracted by additional development

3 Analysis of trip growth and tram capacity "headroom"

A key task was to establish whether the tram provides sufficient capacity to accommodate the estimated increase in trips generated by the potential development levels, and therefore whether it would be reasonable to expect these levels to occur. The analysis was designed to provide the "hardest" test for the tram and so assumptions were made that maximised the likely trip generation. The assumptions are set out in Section 3. The trip generation results were added to the already forecast tram passenger levels, and the totals were then compared with the capacity offered by both bus and tram systems.

Output: Conclusions by tram route section as to capacity to handle trip growth.

[2] West London Tram Model run 60b (June 2005)
[3] A broad assessment was also made of areas 700-800 metres from the tram stops, but this yielded no significant difference in the results.

Research demonstrating the regeneration and investment-attracting attributes of new tram systems are thin on the ground. Some of the more relevant evidence is reported on.

Output: A brief commentary on some other relevant work

3.1 Method for assessing development potential

In summary, an "urban capacity assessment" was undertaken within a 700 metre walk catchment areas of the proposed tram stops. This consisted of identifying sites where a change of use or a more intensive use of the site could result in a larger number of dwellings and/or jobs than currently. This was assumed to result from an incremental and evolutionary process of redevelopment and renewal over time, rather than any deliberate intervention by LB Ealing.

The capacity was judged on the basis of what would or could be acceptable to existing residents, and what would be likely to meet other planning policy requirements such as conservation area policy. The intention was to produce results that were "context sensitive".

A judgement was made as to the most suitable use to which development sites should be put. This was determined mostly as follows:

(i) Sites surrounded by housing, and outside town centres, were assumed to be for housing;

(ii) Sites within the five town centres (as designated in the LB Ealing UDP) were assumed for either non-residential or mixed use;

(iii) Sites outside the centres were assumed as residential or low-density employment;

(iv) Sites within town centre stops pedestrian catchments were assumed for town centre uses (retail, office, cultural, leisure, civic), with residential if appropriate.

Catchment area assumptions

The catchment areas were described as 700 metres from the centre point of the tram stops or platform pairs. These were actual 700 metre walkable catchments, not 700 metre radius circles. In combination, these catchments form what we term the "West London Tram corridor".

The basis for 700 metres was as follows:

- A bus service catchment is commonly held to be 300-400 metres, this being the distance up to which the majority of passengers are prepared to walk to reach the nearest stop. For a high frequency bus service such as on the Uxbridge Road, it seems reasonable to assume that 400 metres is more appropriate than 300 metres;
- The additional quality offered by tram compared to bus is argued to reduce the deterrent effect (generalised cost) of using public transport. Heavy rail stations in London often attract passengers from 1,000 metres. It was decided to adopt a catchment for the tram half way between these assumed bus and heavy rail catchment distances. Thus a 700 metre catchment was chosen.
- The site search was focused within the 700 metres walk catchments of stops for the reasons explained. However, a broader search assessment was also made of sites between 700 metres and 800 metres from tram stops. This yielded results that were not significantly different, and so the 700 metre catchment has been used throughout the analysis in the report.

Density assumptions

Housing

The assumed potential residential density was based on the density ranges in the London Plan density matrix[4]. The location categories in the matrix were related to the tram stop catchments as follows:

1. "Central" - Ealing town centre plus catchment of Ealing/ West Ealing town centre stops;

2. "Urban" - catchments of other town centre stops in Acton, Southall, Hanwell, plus other stops with major connecting bus/train services;

3. "Suburban" – catchments of stops outside town centres, and without major connecting services.

Table 1 shows the assumed housing density for each category of location, together with explanatory notes as to how this related to SRQ policy.

Table 1: Housing Densities

Density(u/ha) / location	Mostly Flats (High Density)	Terraced Houses & Flats (medium Density)	Mixed use (ground floor commercial/retail and flats above)
1. Central (Ealing) Parking <1:1	240*	-	192***
2. Urban + nodes Parking 1-1.5:1	165**	115**	124****
3. Suburban Parking 1-1.5:1	100*****	50*	-

** Low-point from corresponding density range on the matrix; typified by 5 storey apartments*
*** Mid-point from corresponding density range on the matrix*
**** Residential density reduced by 20% to reflect one storey of five in non-residential use*
***** Residential density reduced by 25% to reflect one storey of four in non-residential use*
****** Residential density assumed at low point in the corresponding matrix, typified by 2/3 storey apartments*

Employment

Sites within the town centre catchments were assumed to be developed with 75% plot coverage, and 5 storey buildings including both employment and residential uses, typically with ground floor commercial use and four storeys of apartments above. A major site in Acton, however, was considered suitable for employment and commercial uses only. The impact of this on the Acton Square tram catchment is visible in Figure 3. Employment on town centre sites was assumed to be 1 employee per 20 square metres of floor area[5].

Other sites in the tram corridor suited to employment use were assumed to have 50% site coverage, also with 1 employee per 20 square metres of floor area. This lower density assumption is based on lower public transport accessibility outside the town centres.

Where there was uncertainty about the reasonableness of these assumptions regarding specific sites, the issue was discussed with LB Ealing planning officers.

[4] Mayor of London, "The London Plan", February 2004, Table 4B.1
[5] English Partnerships, Regional Development Agencies, "Density Guide", 2001, gives a floor area per employee of 1:19 for purpose built offices and 1:20 sq m for town centre retail.

3.2 Trip generation assumptions

In order to determine the likely number of tram trips that would arise from the identified additional development, assumptions were used that erred on the high side. This was because of the need to ensure that the extra trips generated could be handled without exceeding the capacity of the tram. It is important to stress that this exercise therefore is NOT being applied to justify patronage levels for economic appraisal purposes. The forecasting of revenue and other benefits requires caution in the opposite direction, namely estimating at the low end of the range of possibilities.

The assumptions used are as follows.

Jobs and journey to work

The assumptions for passenger trips generated by new jobs are shown below. They are designed to maximise the likely demand, in order to assess the capability of the tram to handle peak traffic.

Table 2: Trip generation from new jobs

1	Employees per job	1
2	Inbound trips by mechanised mode per job *(based on typical London mode split)*	0.9
3	Inbound trips by mechanised mode made in peak 3 hour period *(65% of 2, based on typical values)*	0.59
4	Inbound trips by mechanised mode per job in peak one hour *(deduced as ~50% of 3 above, based on typical values)*	0.30
5	Inbound trips by tram per job in peak one hour *(assumed at ~80% of 4 above)**	0.25
6	Inbound trips by tram per job in peak one hour per direction *(assumed at 50% of 5 above)***	0.125

Typical values in the table have been derived or estimated using data from the National Travel Survey.

** Inbound trips by public transport are estimate to consist of about 60% trips along the Uxbridge Road and 40% to and from the Uxbridge Road (data supplied by TfL/LB Ealing). The tram is assumed to serve all of the Uxbridge Road trips, and half of the trips coming to or from the Uxbridge Road (implying interchange from bus to tram). This is purposely assumed on the high side in line with the "hardest test" scenario for the tram.*

*** It is assumed that employees will live in equal numbers east and west of their employment.*

Residential development and peak hour trips

The dwelling numbers have to be translated into peak hour trips on the tram. Again, the assumptions used are designed to provide the maximum likely trip generation. The assumptions behind this calculation are shown in Table 3 below.

Table 3: Trip generation assumptions - residential units

1	Average household size	2.3 persons*
2	Trips per person per day (average) *(approximation based on National Travel Survey regional data)*	3
3	Trips per dwelling per day *(derived from 1 and 2 above)*	6.9
4	Home to destination as proportion of all trips *(i.e. assumes that 20% of trips are not home-based)*	2.76 trips per day (40% of 3 above)
5	Of which using the tram *(50% of 4 above based on TfL data on distribution of trips in relation to Uxbridge Road)*	1.4 (rounded from 1.38)
6	Of which made in am peak hour *(high assumption - 20% of 5 above)*	0.3 (rounded up from 0.28)

** Based on average London household size in 2001 of 2.3, acknowledging the continuing decline in household size over time, but also acknowledging that average household sizes in some minority communities are higher than average.*

It is further assumed that all additional trips are loaded in the peak direction, and that the trips generated by new dwellings are additional to those generated by new jobs. These assumptions clearly produce trip numbers that are higher than would in practice be realised. It is therefore important to reiterate the point that the results are useful in determining the capability of the tram to accommodate trip growth, but NOT as part of economic justification for the tram, which requires assumptions to be cautious in the other direction.

Assumed public transport service levels

Bus services are assumed to peak (in terms of ability to operate at a reasonable level of reliability) at **2,800 – 3,500 passengers per hour**. This is based on 20 – 25 high capacity vehicles (140-passenger bendy buses) per hour per direction.

Peak tram capacity is assumed to be **6,000 passengers per hour**, based on 20 trams an hour per direction with a practical capacity of 300[6]. There would be the potential to accommodate at least 320 people on a tram, at a level of crowding that could be considered acceptable over a few stops, and for a limited period of the day. This "peak of peak" capacity would be about 6,400.

In the longer term there would be potential to increase the peak tram capacity figure further by increasing tram frequency. Overall the top capacity could be in excess of 9,000 passengers per hour based on 30 trams per hour, i.e. 50% more than is currently proposed. However, this is a theoretical capacity and in practice the impact of such a frequency on reliability and level of service for other modes would need to be taken into account.

The logic of development benefits

The tram, it was argued in the earlier work, can reduce the proportion of travel by car, and hence reduce the traffic and environmental impact of higher levels of activity[7].

[6] Short-haul public transport vehicles are rarely evenly loaded, hence a practical capacity figure of 300 has been assumed.

[7] The medium to long term reduction of traffic is likely to depend on the availability of road capacity. For example, if the tram infrastructure and operation reduces capacity for general traffic, then it is less likely that traffic levels will build up again after the initial transfer of trips from car to tram.

The tram can also benefit deprived (low car owning) communities by focusing new homes and jobs in locations accessible by public transport. This is supported by the Town Centre Strategies in the Ealing UDP.

It is not just the town centres where increased development intensity can be achieved. The tram corridor as a whole will be able to support higher intensity development, though of course trip-attracting uses such as employment, retail and leisure will be focused mainly in the town centres. Elsewhere the potential is likely to take the form of residential and mixed-use development. It is noted that more than a quarter of new floorspace proposals in the Ealing Unitary Development Plan are located alongside or close to the Uxbridge Road, although this reflects the proportion of the Borough that lies within this corridor.

There are two main ways in which the accessibility benefits of the tram can be translated into quantified development potential:

- The higher level of accessibility provided by the tram (mostly in terms of perceived higher quality service and quicker and/or more reliable journeys compared to buses) means that larger catchment areas can be expected for each stop. This means a larger area of search for potential development sites than with buses, enabling the assessment of higher development capacity;
- The extra capacity provided by the tram provides "headroom" for additional trips along the corridor. This should enable an assessment of the extra people and jobs (in particular) that can be supported by the tram compared to buses.

These aspects are set out more fully in the method section below.

Quality and capacity impact on development

It should be noted here that there is no currently accepted or workable method for calculating the development that will be generated as a result of the tram. As studies in Sheffield, Tyneside, Croydon, Birmingham, Dublin and elsewhere have found, the actual pattern of development is dependent on a wide variety of variables, both macro and micro, making it impossible even retrospectively to determine the specific impact of a tram scheme, let alone to predict such effects. This conclusion holds for the general effects of a tram scheme, but it applies with even more force to the specifics of a tram scheme such as service frequencies, or hours of operation, or perceived overall quality. In short, modelled changes in accessibility (as opposed to capacity) cannot as a rule be translated into development potential or likely take-up.

Considerable reliance must therefore be placed on the development capacity that can be generated by the tram's higher capacity, and the deployment of qualitative arguments to predict the extent, timing and likelihood of the take up of this capacity.

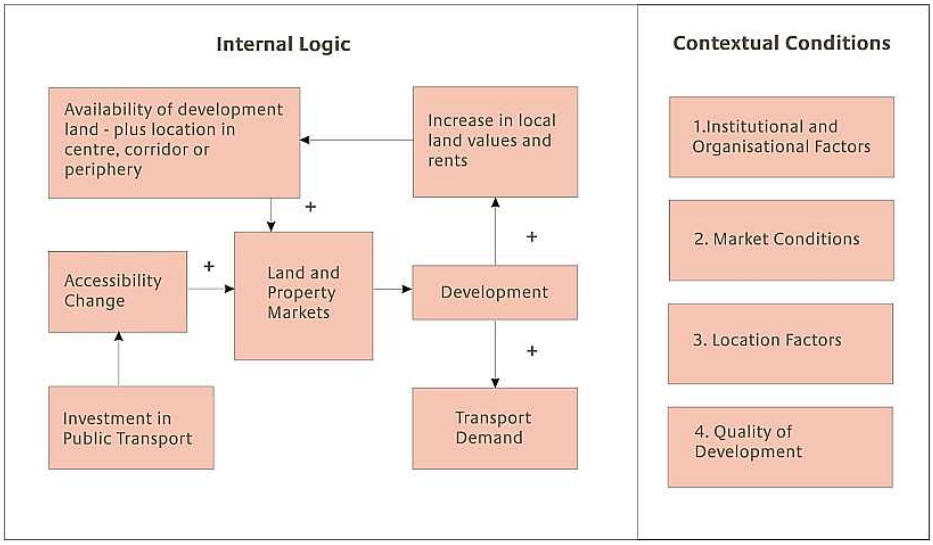
Attributes of the tram other than capacity (such as confidence generated by fixed-track investment) are known to be important in stimulating development interest. However, the effect of such factors cannot be readily quantified.

The logic of transit-induced property investment

It may be inferred from the Webtag guidance on transport scheme appraisal that there is no commonly applicable method or model for predicting the economic or land use impacts of transport projects[8]. However, the logic behind such impacts is summarised in the diagram below.

[8] http://www.webtag.org.uk/ also see Banister D. and Berechman J. (2000) "Transport Investment and Economic Development", London, University College London Press.

Figure 1: Structural Relationships at the Local Level



Source: "Transport and City Competitiveness: Literature Review", Llewelyn Davies Yeang, March 2003.

4 Development potential in the Uxbridge Road corridor - Results

The designated town centres

Sites were considered for their potential to take non-residential floorspace if they were within the designated town centre areas. Non-town centre sites were reviewed but with the exception of the Acton Vale area were judged to be inappropriate for job-related development on accessibility and policy grounds[9]. On sites identified for mixed use within the town centres, the assumption was that non-residential uses would occupy the ground floor, and usual residential density would be accommodated on upper floors. Some sites (including those identified as employment sites) were assumed to not include residential.

Employment sites

The number of jobs that could be provided on all the additional sites judged suitable for employment uses has been assessed at 15,600. This figure comprises 10,800 on sites already identified by LB Ealing, and 4,800 on further sites identified in this study. From 2006, therefore a total of 15,000 jobs could be provided in the corridor on identified sites. An unknown number of jobs is already provided on many of these sites, so the net increase in jobs will be lower. We have assumed a net increase of 50% of the total, at 7,800. This equates to a 24% increase on the number of jobs assumed to exist in the Wards straddling the corridor in 2006 (and 25% increase on the 2001 figure). This compares to an expected general level of job growth in West London of 11% by 2016.

This higher level of job growth in the WLT corridor in Ealing would be expected to amount to a spatial concentration of available growth in the tram corridor, rather than an increase in growth overall. This outcome is regarded as desirable and consistent with London and Ealing (and indeed, national) policy, which is aimed at concentrating growth where it can be well served by public transport and where dependence on the car can be reduced. The concentration of job growth in the tram corridor would also benefit to those living in deprived Wards close to the tram (other things being equal), because it would mean that a higher proportion of the additional jobs would be accessible to those people by public transport than would be the case if the jobs were spread evenly across the Borough.

Table 4: Jobs in the West London Tram Corridor

1	Jobs in the corridor in 2001	31,250
2	Jobs in corridor expected in 2016 assuming London Plan growth rate for West London (31,250+11%)	34,700
3	Of which already provided by 2006 (assumed one third of 3,450 expected growth 2001-2016)	*1,150*
4	**Assumed jobs in corridor 2006 (1 + 3 above)**	***32,400***
5	Job capacity on redevelopment sites identified by LB Ealing in WLT corridor and subject of a development brief	*10,800*
6	Job capacity on further sites identified in this study	*4,800*
7	Total job capacity on redevelopment sites (5+6)	*15,600*
8	**Net increase in jobs on redevelopment sites (assumed at 50% of 7 above)**	***7,800***
9	Net increase in jobs as a percentage of assumed 2006 figure	*+24%*
10	Total jobs in corridor (by notional 2016) (4+8)	*40,200*
11	Net increase in jobs as a percentage of 2001 figure	*25%*

[9] There may be sites outside the most accessible locations that are suited to low-intensity employment, but a residential allocation was selected for the purpose of assessing maximum tram loading.

Allocating work trips generated by additional sites

The following assumptions have been made:

- The work trips are distributed 50%-50% as between east and west of the employment sites;
- All the trips involve passing through the centre that precedes the employment site.[10]

Residential development potential

For residential development, sites were examined in the town centres and within the rest of the corridor, again using a 700 metre actual walk catchment.

Table 5: Dwelling units and population in the West London Tram Corridor

		Population	Dwellings
		(Estimated and rounded)	
1	Existing population in corridor (estimate)	64,150	27,900
2	Population in corridor expected in 2016 assuming London Plan growth rate for West London (64,150 + 8% - rounded)	69,300	30,130
3	Of which already provided by 2006 (assumed one third of 5,150 expected growth 2001-2016)	1,700	750
4	**Assumed number in corridor 2006 (1 + 3 above)**	**65,850**	**28,650**
5	Additional capacity on sites identified by LB Ealing	5,600	2450
6	Additional capacity on sites identified by this study	3,900	1700
7	**Total residential capacity on redevelopment sites* (5+6)**	**9,500**	**4,150**
8	Increase as a percentage of assumed 2006 figures	+14%	+14%
9	Total in corridor (notional by 2016) (4+7	75,350	32,800
10	Increase as a percentage of the 2001 figures	+15%	+15%

** The identified redevelopment sites for residential use involve no loss of existing dwellings, which means that the net increase is the same as the gross increase.*

The potential total dwelling units that could be provided up to 2016 on the identified sites for which LB Ealing has prepared briefs, together with the sites identified in this study is estimated at around 4,150. This equates to a 14% increase in the assumed 2006 residential population within the tram corridor in Ealing (15% increase on the 2001 figures), compared to the 8% general growth from 2001 to 2016 identified in the London Plan.

As noted in relation to employment, it is assumed that the potential for higher level of growth in the WLT corridor would amount to a spatial concentration of growth rather than an overall growth. Given the greater ability for trips to be handled on public transport in the tram corridor, this would be consistent with and helpful to the implementation of key transport and land use policies.

The growth potential assessment has been based on a judgement of what each site can reasonably accommodate, taking into account the density ranges set

[10] For example, it is reasonable to assume that a proportion of people commuting to Acton will board the tram west of Ealing Broadway. To be cautious we assume that all commuters board before the previous town centre.

out in the London Plan, and the local context of each site. Densities have been assumed that maximise the potential of sites, but without compromising the urban quality and character of adjacent areas. Clearly there is an element of subjectivity in such an exercise, but the judgements were greatly helped by the series of detailed development briefs produced by LB Ealing for a range of sites in the Uxbridge Road corridor. We may term the output a "context-sensitive" scenario. It should be noted that redeveloped of the assessed sites involved no loss of existing dwellings.

Higher levels of population growth may be feasible in the longer term, if the market circumstances and higher land prices provide incentives for wholesale redevelopment of parts of the tram corridor to higher densities than have been identified in this study. However, this is judged to be unlikely in the period up to 2016.

The next section considers whether the increase in trips resulting from redevelopment and regeneration at the levels identified (both employment and population led growth) could be accommodated on the tram.

4.1 Capacity implications of the tram

General points

Important questions relating to the planning of the West London Tram are firstly, whether the tram can accommodate the demand predicted for it, and secondly, whether the demand could equally be net by buses. One of the difficulties is that demand is expected to be much higher with the tram than without on the basis that it provides a more attractive service.

Taking the demand modelling results from Transport for London (April 2006) it appears that in the Monday to Friday morning peak hour (normally expected to include the highest peak), the part of the route in Ealing of most concern is eastbound from Hanwell to Ealing Broadway. Over this stretch forecast demand is in excess of 70% of the tram's capacity, and so the impact of extra demand from new development needs to be examined.

Taking the Uxbridge Road within Ealing as a whole, forecast demand with the tram exceeds the assumed capacity that could be provided by bus services over 8 out of the 23 inter-stop sections. However, as noted already, much of this forecast demand, namely that consisting of mode switch, is unlikely to arise unless the tram is provided. This could amount to 50% of total demand for the tram. Demand based on current population and employment levels alone therefore can be met by the present bus-based services, although unreliable journey times are already reported as an issue.

The analysis here focuses on the part of the route where the capacity of the bus gives rise to the greatest concern. This is the Hanwell to Ealing Broadway section in the am peak hour. The remainder of the route does not give cause for concern as far as the am peak is concerned. However, there are likely to be emerging capacity constraints in the westbound direction in the afternoon peak (see Section 7).

Hanwell to Ealing Broadway

The cumulative effect on trips of the additional housing capacity identified could result in approximately an extra 400 am peak hour trips on the tram by the time it reaches the section between West Ealing and Ealing Broadway.

Additional jobs east of this section (and thus attracting work trips over this section) could also add approximately 1000 extra passengers over the busiest section between St Leonard's Road and Ealing Broadway.

Assuming that the residential-led passengers and the job-led passengers are mutually exclusive, there are around 1,400 extra passengers to be

accommodated on the busiest section the tram over and above the current forecast level of around 5,200, giving a total peak demand of 6,600.

This level of demand includes predicted trip transfers from bus and rail, and forecast general job and population growth in west London, as well as net additional growth from identified development sites as reported in Tables 4 and 5.

The total is somewhat above the indicative initial tram capacity of 6,000 passengers per hour, although only for a very limited part of the route. If the assumptions and estimates are valid, then we may conclude from this that the tram will be able for the most part to accommodate the peak passenger demand when the development sites are fully taken up. The 600 passengers above the notional capacity in the am peak hour between Northfield Avenue and Ealing Broadway could be accommodated on the trams without increasing the frequency above the assumed 20 per hour, but with a load factor of 320 rather than the more comfortable 300.

In the longer term, tram frequencies could be increased in order to provide further capacity "headroom". This would provide additional scope for more intensive development, especially at Ealing Broadway.

Figure 2: Potential dwellings additional to that on currently identified sites by Tram stop catchment area

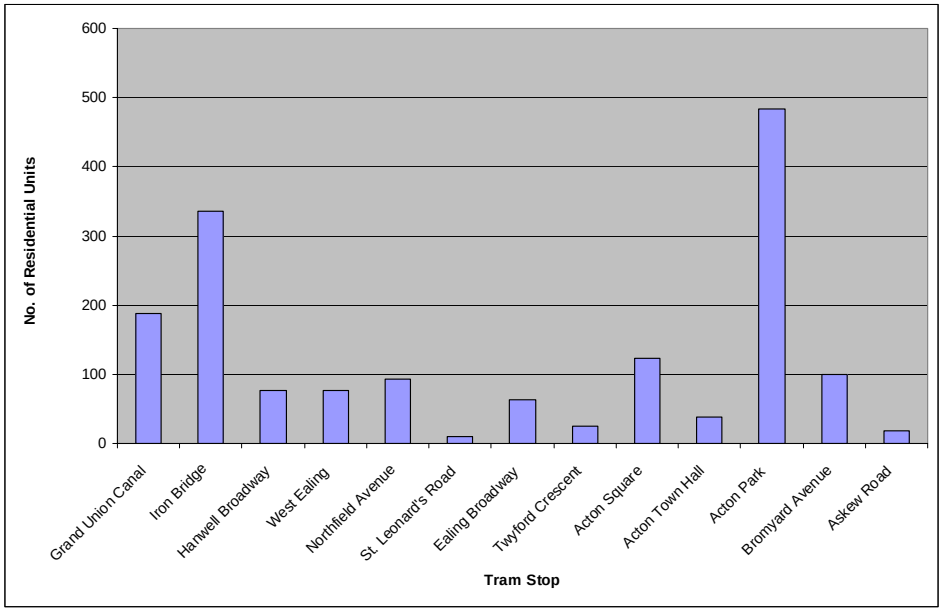
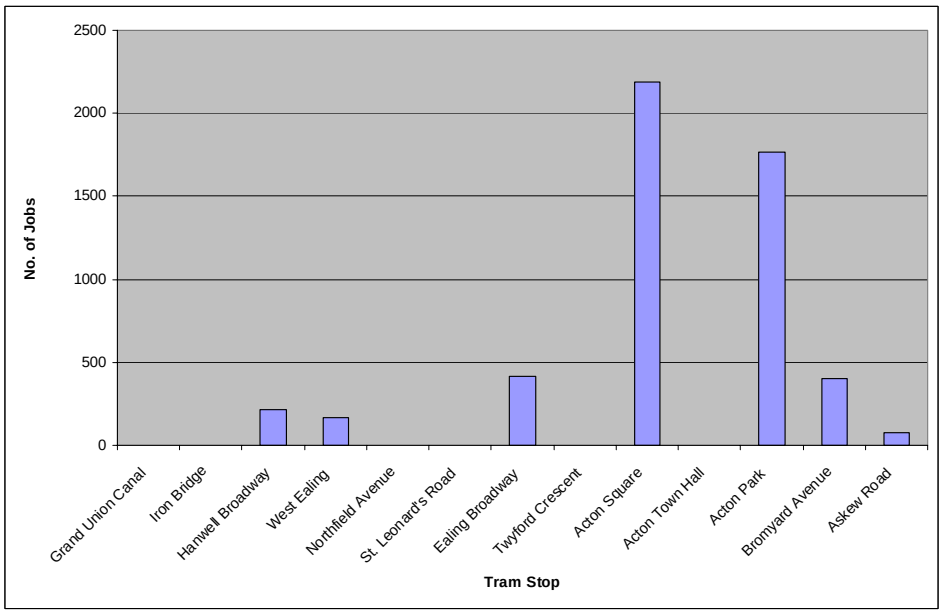


Figure 3: Potential jobs additional to that on currently identified sites by Tram stop catchment area



Benefits in terms of social inclusion and deprivation

Insofar as the tram attracts further investment in jobs and housing, it will at the same time indirectly increase investment in community and other facilities. Depending on the distribution of such facilities, the tram could be said to indirectly but positively affect people living in the deprived Wards along the tram corridor, namely those in Southall Broadway, Southall Green, Norwood Green and South Acton wards in particular.

In terms of access to opportunities for employment and other facilities, the tram does not provide much benefit for those in deprived wards over and above the benefit derived for everyone. The real benefit for those in deprived wards, where car ownership is low and people have less choice of accessible destinations, is

the tendency for the tram (compared to the bus) to concentrate employment and other facilities within the public transport corridor, rather than in less accessible locations. For example, the potential for higher density employment at Acton town centre and Acton Vale could be of direct benefit to people living within the tram catchment areas.

5 Longer term and further development opportunities

Development outside the tram corridor

Not all tram patronage will be generated solely within the tram corridor. To a certain extent development that occurs outside the corridor can also generate trips on the tram, either with people opting to walk to it from further than the assumed 700 metre catchment, or with people accessing the tram by bus (or cycle). Such development opportunities have not been assessed, requiring as they would an extensive review of routes intersecting with the corridor, and potential development sites along them.

Sites immediately outside the 700 metre catchment have been considered, however, but only one proved large enough to warrant special mention in the context of tram capacity and impact. This is the Southall gasworks site, which is discussed below.

"High growth" scenario

The main assessment in this report is based on "context sensitive" capacity and design. However, it may be possible to develop aspirations for longer-term change that produce a "step change" in development opportunities. The following paragraphs provide a "soft focus" look at the possibilities.

The character of developments and patterns of site boundaries and ownership will provide an important context in terms of the likelihood of further development potential. In this respect it is noted that along many parts of the tram corridor, site depths are shallow (reflecting their "ribbon" housing development origins). This limits frontage development potential, and in many places substantially higher intensity development would mean "breaking out" into relatively stable areas of housing that lie behind the Uxbridge Road frontages. Shallow frontage sites are particularly a feature of Southall, and much of Hanwell and Acton. This can be seen in the maps in the technical appendix.

Larger sites and areas with more mixed or changeable land use are those where perhaps a step-up in terms of development intensity would be more feasible. The area most suited to this is the area around Ealing Broadway. Not only are there potential redevelopment sites, but also the highest levels of public transport accessibility within the corridor. Accessibility in fact is amongst the highest of any suburban location in London. Higher intensity development would be consistent with the tram, and possibly could be promoted by the tram.

Southall

Broadway comprises mostly small units with shallow plot depth. Major increases in density would involve intruding onto sites to the rear of the frontage, and this would occur only if there was a substantial rise in land values.

Southall South Road

A number of sites have been identified. The varied nature of the area in terms of both land uses, building types and plot sizes means that much higher densities and physical restructuring could be envisaged. However, this could be seen as a product as much of Southall station as the tram.

Southall gasworks site

The northern edge of this 30 hectare site is within a 700 metre "crow-fly" distance of the tram, but mostly outside the actual 700 metre catchment. This would lead us to exclude the site in terms of its development being sparked by the tram. On the other hand it is likely that a proportion of people using this site would use the tram, perhaps accessing it with a "feeder" bus. Further

consideration of this site would be needed to assess the likely scale of such movement. The site will, however, require public transport serving the site directly. Accessibility levels will still be relatively low, however, making this site less suitable for trip-attracting activity. The current development brief for the site does not address the distinction between inbound and outbound accessibility, and consequently may under-estimate the difficulties that would be encountered of mixed use non-residential activities on the site. If the tram were to be aimed at regeneration potential (rather than the solution of transport capacity problems on the Uxbridge Road), then the potential for an extension of the tram would be worth exploring from Southall through the Southall gasworks site towards Heathrow airport via West London's largest opportunity area at Hayes and West Drayton.

Ealing Broadway

As noted above, it is possible to envisage longer-term redevelopment and expansion of Ealing Broadway as a major centre and interchange, especially in conjunction with further rail provision (Crossrail). This could involve a major change in character, to match its designation as a centre of metropolitan importance. There could be significant advantages to Ealing of such an approach, for example reducing the economic "leakage" caused by residents travelling to other boroughs for shopping and employment. Maintaining Ealing Broadway's relative position in the retail and leisure hierarchy will be an important challenge when the White City development opens.

Acton town centre

Recent developments in Acton town centre have responded to the policy for maximising residential densities consistent with sensitivity to local environmental conditions. In assessing further capacity this policy was assumed to continue. A number of sites were identified within the designated town centre, and these have potential for mixed-use development with retail or other commercial use on the ground floor and residential above.

The main development opportunity was identified as the Morrisons site. We envisage that this site including its current car park could be much more intensively used for retail and commercial use, providing substantial extra employment as well as retail opportunities in Acton. This important site would be "supported" by the availability of other smaller sites in the vicinity, thus enabling commercial critical mass to be built up. The Morrisons site and these other sites are at an important "node" on the tram route, with potentially good quality connecting bus routes to the north and south.

East Acton/Acton Vale

There are a number of fairly large areas currently in employment or mixed use, especially on the south side of Uxbridge Road opposite Acton Park. Some parts of the area are already proving successful for media and other businesses. There has been some recent higher density housing development. This area provides an example of where the higher quality image and service provided by a tram could give added development potential and confidence. Some sites in this area could be redeveloped to higher densities and with a greater mixed-use element. The frontage overlooking the park, in particular, could have further potential for high density apartments above commercial uses. This area accounts for a high proportion of the potential for additional employment identified in this study (see Figure 2).

Ealing Common

Ealing Common is important because it provides one of only two interchanges between the tram and the Underground system. As an important node it would have potential for much high density residential development, and also for non-residential uses. However, the lack of sites for such development, the proximity of important open space, and the relative solidity of existing housing development led to the conclusion that Ealing Common should primarily focus

on providing high quality public transport interchange, rather than develop into a node of activity with high levels of inbound traffic.

In addition it was judged that potential for increased intensity development would be better accommodated in the designated town centres, in part to achieve sufficient critical mass to compete effectively with White City and other centres outside the Borough.

General planning policy

Policy and other measures could help to stimulate and attract higher levels of development in the Uxbridge Road corridor. The range of development briefs already prepared to a consistent level are important, and could be extended to include the additional sites identified in the present project.

Ensuring the take up of identified opportunities will also require the confidence that approval of the tram system will provide. The earlier the go-ahead can be secured, the less likelihood there will be of sites being developed at sub-optimal density.

As well as the tram, and also as part of the tram scheme, it will be necessary to act pro-actively to ensure that higher intensity development functions effectively. This will require positive policies and measures to deal with aspects such as parking, deliveries and local traffic circulation.

An important element will be a pro-active approach to encouraging development, for example using local-authority sponsored masterplans and competitions, as compared to reliance of market reactions and perceptions, and speculative development. An example might be consideration of a step-change expansion of Ealing town centre, so that it develops into a much more important metropolitan centre than at present.

A further aspect of growth potential that may be of significance in terms of the benefits of the tram is the provision of extra facilities in the corridor for leisure, recreation, education, health, community and other uses. These tend to make use of public transport at times other than the work-related peak hours. This can be extremely beneficial for the economic viability of the public transport service, by helping to reduce the peaks and troughs of demand throughout the day. As noted in this report, there would be sufficient spare tram capacity throughout the corridor at inter-peak and off-peak periods of the day to attract and provide for such additional trips. It will be important for planning policy to ensure that new non-residential facilities that attract passenger trips are concentrated within the 700 walk catchment of the tram, and equally to ensure that such facilities are not built outside this catchment. Where such activities are contemplated outside the tram catchment, very careful consideration will need to be given to how well they can be served by other public transport. Examples would be the Southall gasworks site and non-residential facilities on the South Acton estate.

The timing and phasing of development is important. For example, some evidence supports the view that development is triggered in advance of the opening of major new transport facilities, in which case the date of approval of the tram project may be more appropriate as the base date than the date of opening.

6 Features of the West London Tram compared to bus

6.1 The key differences

The characteristic that has provided the focus for this study is the higher capacity of the tram compared to the bus. The Uxbridge Road corridor has already taken a step towards higher capacity with the introduction of "bendy buses" with a capacity of about 140. The tram will more than double the capacity per vehicle. It is peak hour capacity that is of most interest in determining the potential of the tram in accommodating trip growth arising from growth in jobs and population. The capacity gain (as opposed to quality gain) is of less relevance to retail, leisure and other activities because trips to these are less concentrated in the peak hours.

In terms of attracting investment and growth along the Uxbridge Road corridor, perception of public transport quality is potentially important. This results in the use of an expanded catchment area for the tram compared to the bus, as described earlier. But the perception of the tram as a committed and high quality service can provide a level of confidence which buses generally fail to do. This impact is not easy to assess, however, and we have made no attempt to do so in this study.

A further difference between tram and bus concerns service reliability, i.e. regularity of service headways. It is generally, though not universally, agreed that trams can operate more reliably than bus services. In practice it is difficult to compare the two, since investment in trams is almost always associated with investment in priority measures that enhance reliability. Without priority measures trams operate no more reliably than buses. Moreover, high levels of priority can also enable bus services to be operated with a high degree of reliability, as for example on the Dutch "Zuidtangent" services and Ottawa's Transitway, both of which have a high proportion of route on segregated busways. Much depends on the degree of segregation of vehicles from other traffic (both in space and time) and the regime of enforcement of private vehicles infringing parking and other traffic regulations, causing obstruction or delay to public transport vehicles. Generally speaking the presence of trams reduces the incidence of obstruction by parked vehicles, because drivers understand that trams cannot divert around them as buses can.

In the Uxbridge Road context, the difficulties of operating a reliable and regular bus service arise not only from difficult general traffic conditions but also from the sheer volume of bus traffic.

6.2 Benchmarking evidence

This section considers some evidence related to the following propositions:

- Trams support business activity along their route;
- Trams attract investment interest more than is the case with buses;
- Trams attract higher value uses and more intensive development within their catchments than do buses.

Tram stops as a focus for local activity

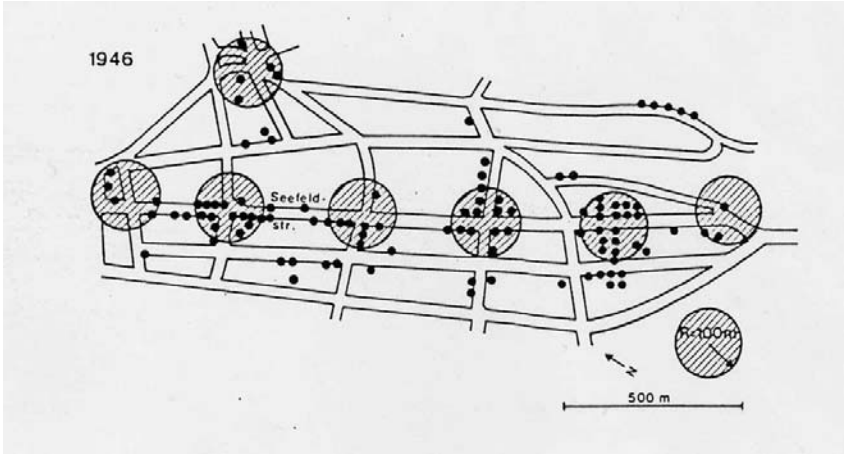
There is some evidence that businesses survive and thrive better close to tramstops compared to other locations further away from the stops. Analysis of a "before and after" situation was undertaken in Zürich in 1946 and 1981. This looked at the number and location of food shops in a particular district of inner Zürich. This found:

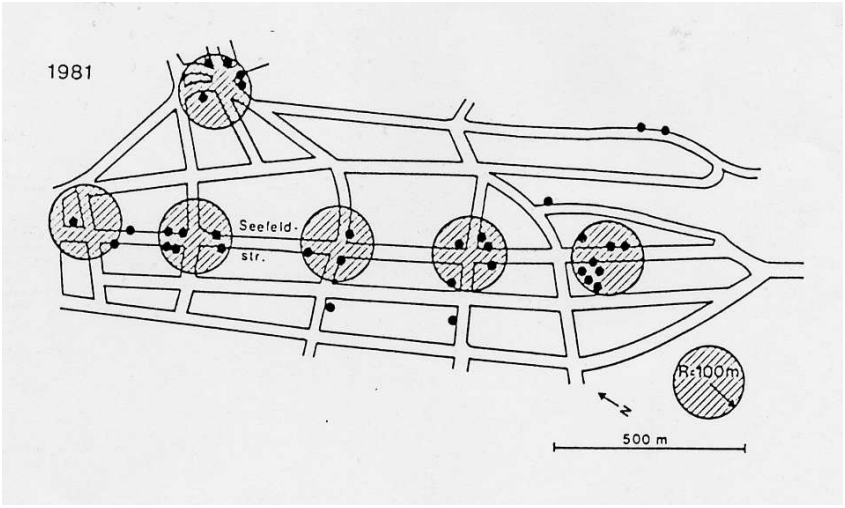
- The number of foodshops in the study area had declined by 67 %

- The decline in foodshops further than 100 metres from a tramstop was 85% (from 39 to just 6)
- The decline in foodshops within 100 metres of a tramstop was 54% (from 63 to 29).

Although a limited piece of data, it suggests that the presence of a tramstop can help to retain business activity, especially in locations very close to the stops. The time series data are shown diagrammatically below.

Figure 4: Location of food shops and tram stops in the Seefeld District of Zürich 1946 and 1981[11]





[11] Source: Willi Hüsler, presented at Walk 21 conference, Zürich, September 2005

Figure 5: A Seefeld (Zürich) District tram stop today

Trams as a regeneration tool

A general proposition is that a tram can aid regeneration and growth. However, this has to be elaborated further before any meaningful analysis can be undertaken. Here we are not saying that trams are capable of reversing endemic poor economic performance, or of generating growth beyond the level that can economically be provided. It is more a question of whether trams can work with other factors favourable to regeneration and growth, and to do this more effectively than can purely bus-based public transport.

In Sheffield, the "Supertram" was regarded as a means of boosting economic redevelopment in the former steelworks area (Lower Don Valley). A study of the impacts of the tram did not, however, produce conclusive evidence that this had occurred[12]. The study found that less than a third of the predicted 1,135 new jobs had materialised and concluded that the impact of the tram on development and regeneration was small. "Road investment remains a far more significant factor in accounting for planning applications and development projects than fixed transit links." This conclusion was very similar to that of an earlier study of the impact of the Tyne and Wear Metro[13].

This evidence on the face of it does not support the proposition that the West London Tram will attract or enable development, regeneration or growth. But to accept this without examining the relative contexts of the different schemes would be irresponsible.

First, both Newcastle and Sheffield introduced trams in circumstances of economic decline, low car ownership and high unemployment. While there are pockets of west London that might fit this description, it is not the general condition found in the Uxbridge Road corridor.

Second, both Tyneside and Sheffield actively promoted car-based major retail, leisure and other developments, which generated huge competition from the car at the expense of travel by tram. For example, the Meadowhall regional shopping centre near Sheffield attracted 94% of its customers by car, despite the presence of the tram terminus. The (misleadingly titled) Metro Centre near Gateshead is not served by the Metro light rail. Planning policies in west London, in general, are more averse to car-dominated access, which provides a more supportive context for public transport. The major exception to this is the White

[12] Haywood, R, "South Yorkshire Supertram: Its Property Impacts and their Implications for Integrated Land Use-Transport Planning" in *Planning Policy and Research*, Vol 14, No 3, pp277-299.
[13] Robinson, F and Stokes, G, 1987, "Rapid Transit and Land Use: the effects of the Tyne and Wear Metro", Centre for Urban and Regional Studies, University of Newcastle upon Tyne.

City development, and the potential for this to undermine public transport based travel to established town centres must be acknowledged.

Third, many of the light rail schemes in Britain have been developed in part as transit systems segregated from the road network and thus often segregated from development frontages. Many stretches of light rail route have taken over former railway lines. This almost by definition suggests an uphill struggle in terms of attracting passenger and investment: the railway had already failed. Disused railway alignments make for cheap construction, but they do not necessarily provide rich passenger-generating environments. This applies, for example, to the Meadowhall branch of the Sheffield Supertram, and to the Midland Metro. It applies also to large sections of Croydon Tramlink, where there is little apparent evidence of development investment except near the street-running sections. The Nottingham tram has generated better passenger performance despite the rail alignment, due in part to its role as a Park and Ride facility, rather than a local transport facility. The West London Tram, by contrast, is an entirely street operation, with frontage development along the greater part of its length, and an existing powerful public transport passenger base. Unlike the tram schemes in the provincial cities, it also connects at either end, and at two intermediate points, with high intensity heavy-rail services. Therefore to a much greater extent the West London Tram may be regarded as "thickening up" an already dense and integrated network, compared to the relatively "stand alone" character of the trams in provincial cities.

7 Scope for further investigation

7.1 More detailed modelling

The results and conclusions provided in this report could be underpinned by further modelling work in the longer term. The data from the identified development sites (including those with LB Ealing development briefs as well as additional sites identified in this study) could be used to enhance model outputs at the micro scale. These specific data could replace (in part) the factored growth of population and jobs in the Uxbridge Road corridor. Such an exercise would add precision to the tram patronage forecasts on different parts of the tram route. Such an exercise would be of most benefit if the whole of the Uxbridge Road corridor were to be included, requiring similar detailed investigation of sites in LB Hillingdon and Hammersmith & Fulham to that undertaken for LB Ealing.

7.2 Afternoon peak travel demand

This study focused on the am peak hour demand, and consequently primarily on eastbound travel. Further analysis could usefully be undertaken of westbound travel in the pm peak periods. It is not uncommon to find that the public transport peak is earlier than the car traffic peak, due to school related demand which precedes work-related demand, but the implications in the Uxbridge Road corridor could be considered further in this respect.

7.3 Wider area development potential

This study focuses on sites within 700 metres of the proposed tramstops. There may be potential for additional development on sites further away where these are linked with connecting bus and rail services, and where overall travel patterns are affecting by the increased quality of travel on the Uxbridge Road part of people's journeys. In order to investigate this potential, it would be necessary to generate a detailed picture of the quality of connecting bus services, and the quality of the interchange facilities between these services and the tram.

Technical Appendix

This Technical Appendix consists of the Sites identified by the Consultant Scheme in order to produce the urban potential in terms of jobs and residential units that fed into Chapter 4 above, using rhe assumptions described in Chapter 3. The sites described here are additional sites to those identified by LB Ealing for which Development Briefs were produced.

The sites shown on the accompanying maps refer to the Site Reference column in the table overleaf.

Site Schedule

Area	Stop	Site Name	Site Reference	Area (ha)	Location Type	Designated Use	Housing Density (d/ha)	Employment Floorspace (M2)	Retail Floorspace (m2)	Number of units	Number of jobs	Notes
Acton	Twyford Crescent	Tesco Express	1	0.15	Urban	Residential - High	165	n/a	n/a	24	n/a	Currently used as a garage. Opposite stop so high density residential considered suitable.
	Acton Square	Acton Central Industrial Estate	2	0.16	Urban	Mixed	124	n/a	1226	20	61	Town centre site currently with low employment density uses. Would be more suitable for higher density employment and mixed use.
	Acton Square	Acton Tram Depot	3	0.38	Urban	Mixed	124	n/a	2819	47	141	Large development opportunity close to town centre
	Acton Square	Horn Lane	4	0.13	Urban	Mixed	124	n/a	990	16	50	Currently low quality building suitable for redevelopment as mixed use site in town centre
	Acton Square	Springfield House	5	0.13	Urban	Mixed	124	n/a	975	16	49	Currently low value use on site which could be redeveloped with mixed use
	Acton Square	Lexden Road	6	0.14	Urban	Residential - High	165	n/a	n/a	24	n/a	Open site with little or no funtion. Suitable for residential development.
		Oaks Shopping Centre	9		Urban	Mixed	124			0		
			11		Urban	Mixed	124	n/a		0		
	Acton Park	Gala Bingo	9	0.14	Urban	Mixed	124	n/a	1069	18	53	Large development opportunity close to Tram Stop and High Street
	Acton Town Hall	Builders Merchants	10	0.28	Urban	Residential - Medium	115	n/a	n/a	32	n/a	Site more suitable for residential development
	Acton Park	Back of Copenhagen Gardens	11	0.35	Urban	Residential - Medium	115	n/a	n/a	40	n/a	
Ealing	Ealing Broadway	Garage off Florence Rd.	1	0.20	Central	Residential - med.	115	n/a	n/a	23	n/a	Site more suitable for residential development
	Ealing Broadway	48 The Mall	2	0.04	Central	Mixed Use	192	n/a	300	8	15	Currently a car repair workshop. Would be more suited for mixed use.
	Ealing Broadway	21 The Mall	3	0.17	Central	Mixed Use - High Density	192	n/a	1275	33	64	Low quality office in a location suitable for mixed use.
	Ealing Broadway	Multi-Storey Car Park	4	0.30	Central	employment	n/a	6750	n/a	n/a	338	Multi-storey car-park. Could have othe uses built above, in this case 3 storeys of offices.
	St. Leonard's Road	Garage off Culmington Rd.	5	0.09	Urban	Residential	115	n/a	n/a	10	n/a	Garage in residential location. Would be more suitable for residential use.
West Ealing	West Ealing	64 & 64a Broadway	6	0.11	Urban	Mixed Use	192	n/a	825	21	41	Low quality retail. Could be redeveloped as mixed use.
	West Ealing	66-78 Broadway	7	0.20	Urban	Mixed Use	192	n/a	1500	38	75	
	Northfield Avenue	**Sinclair House**	**8**	**0.08**	**Urban**	**Residential**	**165**	**n/a**	**n/a**	**13**	**n/a**	Currently unattractive office building opposite West Ealing station. Could provide residential use.
	Northfield Avenue	**BT Exchange**	**9**	**0.70**	**Urban**	**Residential**	**115**	**n/a**	**n/a**	**81**	**n/a**	BT Exchange in resdiential location, appears to be in low use.
	West Ealing	105-115 The Broadway	10	0.08	Urban	Mixed Use	124	n/a	600	10	30	Low quality retail. Could be redeveloped as mixed use.
	West Ealing	99-103 The Broadway	11	0.06	Urban	Mixed Use	124	n/a	450	7	23	Low quality retail. Could be redeveloped as mixed use.
Hanwell	Hanwell Broadway	**128 Boston Road**	**1**	**0.12**	**Urban**	**Residential**	**50**	**n/a**	**n/a**	**6**	**n/a**	Poor quality works. Could be redeveloped into residential use.
	Hanwell Broadway	**Cambridge Yard**	**2**	**0.57**	**Urban**	**Mixed Use**	**124**	**n/a**	4303	**71**	215	Adjacent to site identified by LBE as a large scale mixed use opportnity. These warehouses could be part of this overall redevelopment.
Southall	Grand Union Canal	**TA Centre**	**1**	**0.78**	**Urban**	**Residential**	**240**	**n/a**	**n/a**	**187**	**n/a**	Could provide canalside housing close to aTram Stop. May be other issues preventing the redevelopent of a TA centre.
Greenford Rd.	Iron Bridge	Greenford Rd. Timber Yard	1	0.68	Urban	Residential - high density	192	n/a	n/a	131	n/a	Currenrtly used as works/warehouses. Could form part of the development of a transport node at Greenford Road
	Iron Bridge	343-357 Uxbridge Road	2	0.66	Urban	Residential - high density	193	n/a	n/a	128	n/a	Sheds with low employment density. Could be redeveloped as part of Greenford Road node.
	Iron Bridge	Brent Meadow Allotments	3	0.46	Urban	Residential - low density	50	n/a	n/a	23	n/a	Allotments. Depending on ownership/active use could be part of the adjacent residential area.
	Iron Bridge	Navigator Drive	4	0.47	Urban	Residential - medium density	115	n/a	n/a	54	n/a	Within existing resdiential area and adjacent to another site identified by LBE as suitable for residential development.
Acton Park/The Vale	Acton Park	207 The Vale	1	0.18	Suburban	Mixed Use	124	1774	n/a	22	89	Part of an employment area, but currently low employment density. Suitable for redevelopment as mixed use in prime location opposite Acton Park.
	Acton Park	193 The Vale	2	0.33	Suburban	Mixed Use	124	3294	n/a	41	165	
	Acton Park	Allied Industrial Estate	3	2.92	Suburban	Mixed Use	124	29240	n/a	363	1462	
	Bromyard Avenue	27 The Vale	4	0.80	Suburban	Mixed Use	124	8042	n/a	100	402	
	Askew Road	Warehouse	5	0.15	Suburban	Mixed Use	124	1530	n/a	19	77	
Sites shown in bold are in the 400-700m catchment of the Tram Stop. Sites not shown in Bold are within 400m of a Tram stop										**1632**	**5237**	

Client:
London Borough of Ealing

Project title:
West London Tram: Economic Development & Regeneration Potential

Drawing title:
Acton

Date:
May 2006

Project number:
37100

Scale:
Not to scale

Drawing number:
01

Llewelyn Davies Yeang
Brook House
Torrington Place
London WC1E 7HN

T 020 7637 0181
F 020 7637 8740
E info@ldavies.com
www.ldavies.com

llewelyn davies yeang
architecture
planning
design

Client:
London Borough of Ealing

Project title:
West London Tram: Economic Development & Regeneration Potential

Drawing title:
Ealing

Date:
May 2006

Scale:
Not to scale

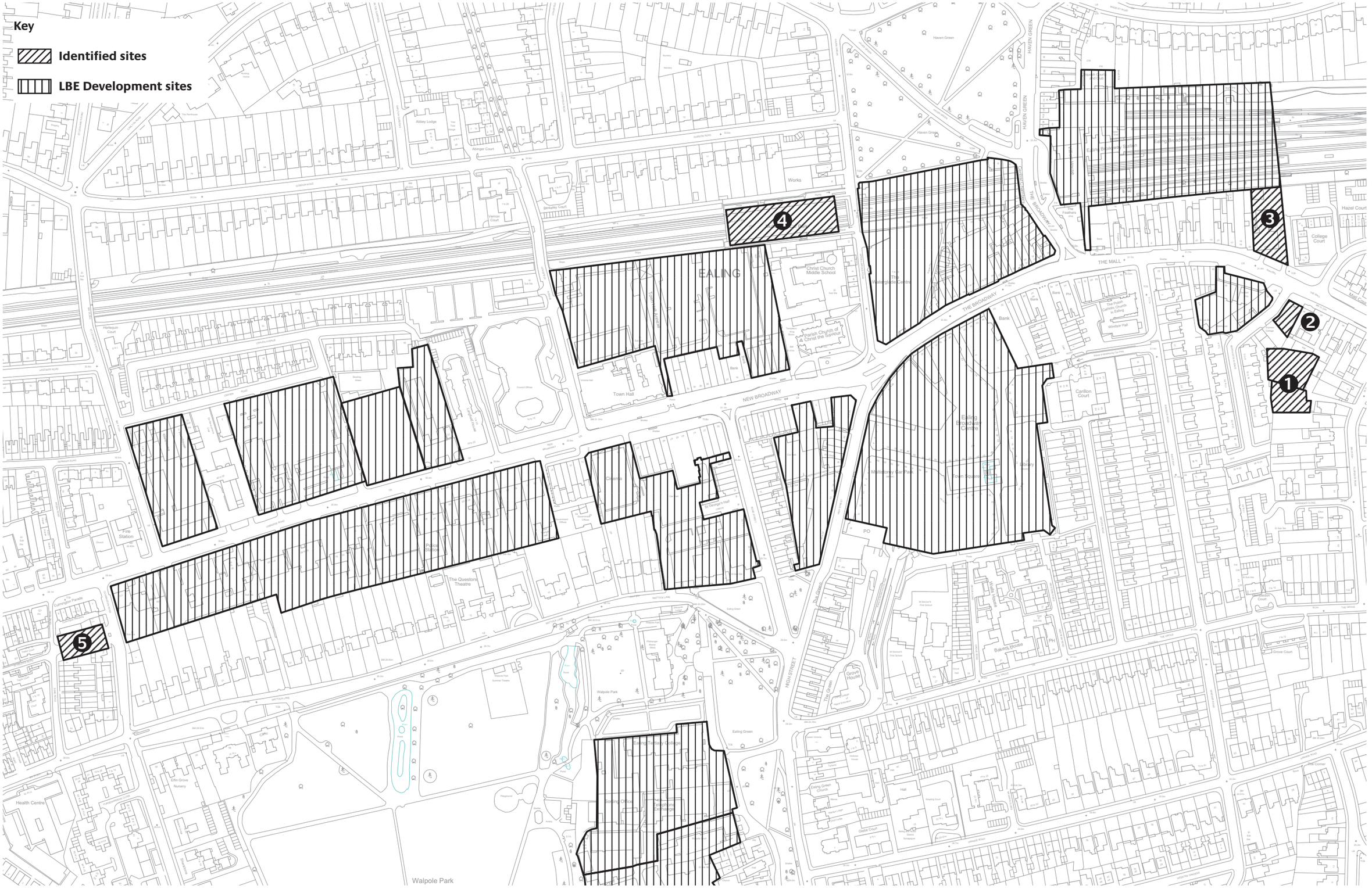
Project number:
37100

Drawing number:
01

Llewelyn Davies Yeang
Brook House
Torrington Place
London WC1E 7HN

T 020 7637 0181
F 020 7637 8740
E info@ldavies.com
www.ldavies.com

llewelyn davies yeang
architecture
planning
design



Client:
London Borough of Ealing

Project title:
West London Tram: Economic Development & Regeneration Potential

Drawing title:
West Ealing

Date:
May 2006

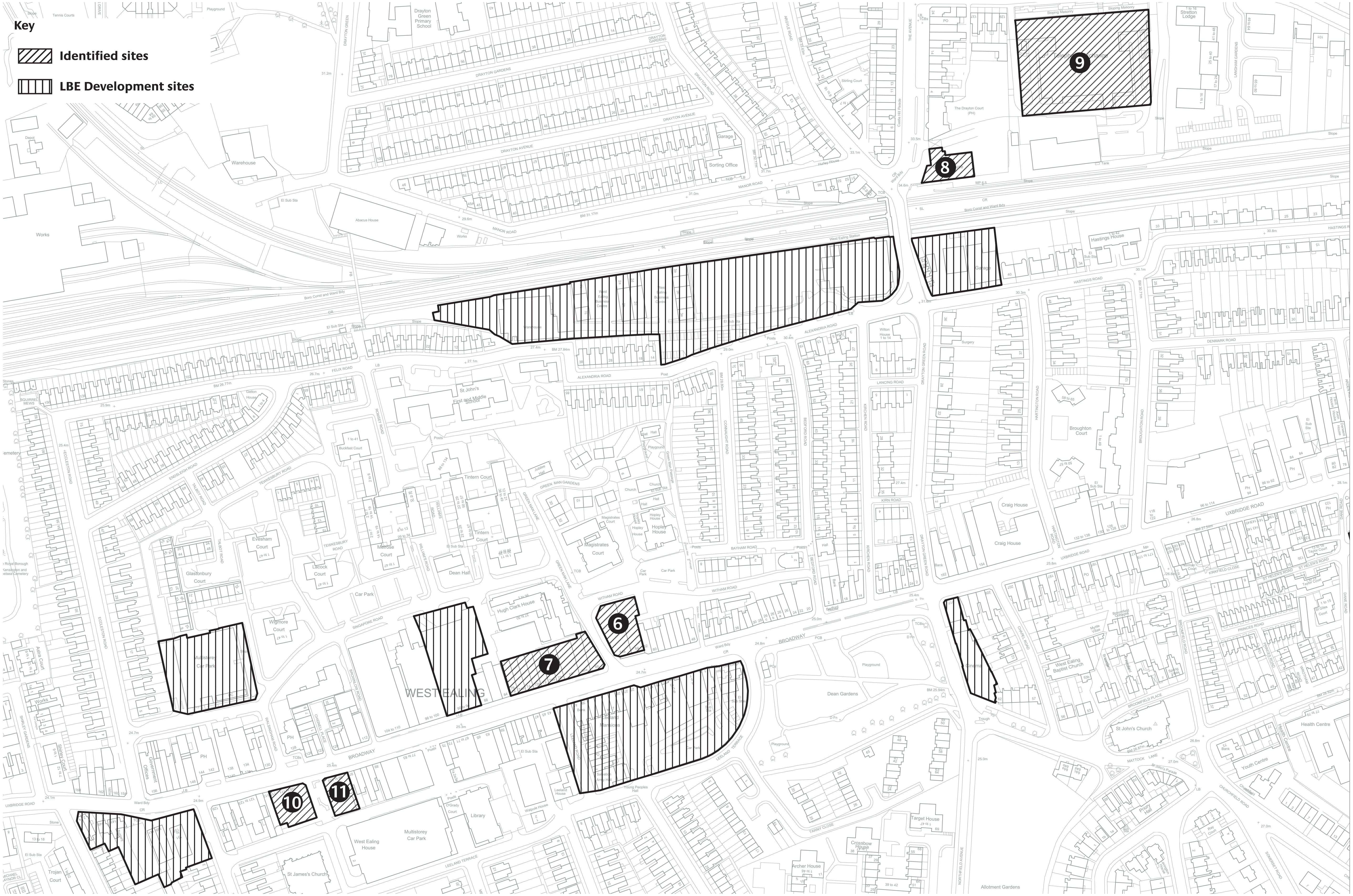
Project number:
37100

Scale:
Not to scale

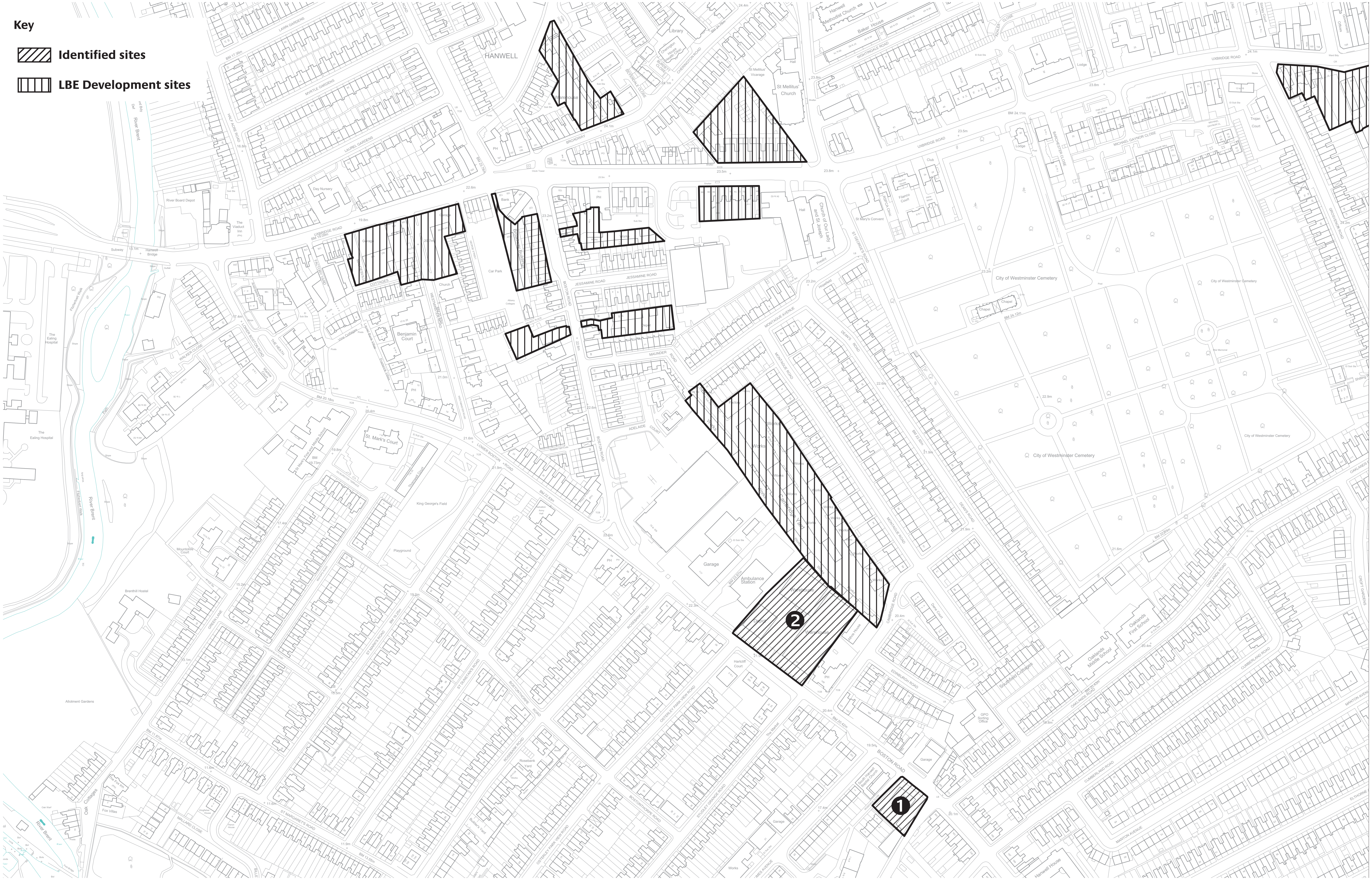
Drawing number:
01

Llewelyn Davies Yeang
Brook House
Torrington Place
London WC1E 7HN

T 020 7637 0181
F 020 7637 8740
E info@ldavies.com
www.ldavies.com



Client: **London Borough of Ealing**	Drawing title: **Hanwell**	Date: **May 2006**	Scale: **Not to scale**	**Llewelyn Davies Yeang** Brook House Torrington Place London WC1E 7HN
Project title: **West London Tram: Economic Development & Regeneration Potential**		Project number: **37100**	Drawing number: **01**	T 020 7637 0181 F 020 7637 8740 E info@ldavies.com www.ldavies.com



Client:
London Borough of Ealing

Project title:
West London Tram: Economic Development & Regeneration Potential

Drawing title:
Southall

Date:
May 2006

Project number:
37100

Scale:
Not to scale

Drawing number:
01

Llewelyn Davies Yeang
Brook House
Torrington Place
London WC1E 7HN

T 020 7637 0181
F 020 7637 8740
E info@ldavies.com
www.ldavies.com

llewelyn davies yeang
architecture
planning
design

Client:
London Borough of Ealing

Project title:
West London Tram: Economic Development & Regeneration Potential

Drawing title:
Greenford Road

Date:
May 2006

Project number:
37100

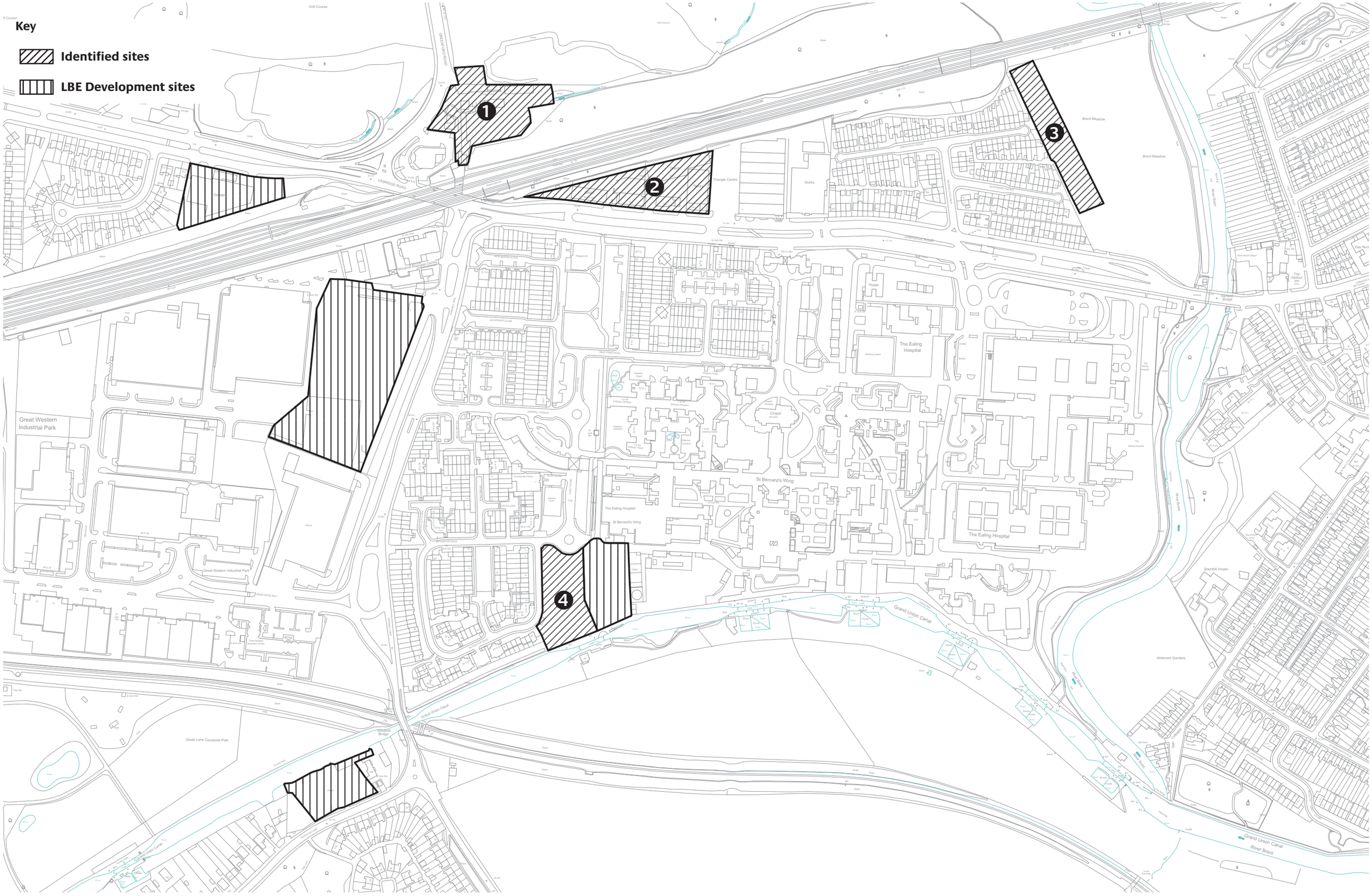
Scale:
Not to scale

Drawing number:
01

Llewelyn Davies Yeang
Brook House
Torrington Place
London WC1E 7HN

T 020 7637 0181
F 020 7637 8740
E info@ldavies.com
www.ldavies.com

llewelyn davies yeang
architecture
planning
design



Client:
London Borough of Ealing

Project title:
West London Tram: Economic Development & Regeneration Potential

Drawing title:
Acton Park/The Vale

Date:
May 2006

Project number:
37100

Scale:
Not to scale

Drawing number:
01

Llewelyn Davies Yeang
Brook House
Torrington Place
London WC1E 7HN

T 020 7637 0181
F 020 7637 8740
E info@ldavies.com
www.ldavies.com

llewelyn davies yeang
architecture
planning
design