Spatial disparity and spatial centrality analysis

Report 1

Draft 03
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Space Syntax
Space Syntax

4 Huguenot Place
Heneage Street
London
E1 5LN United Kingdom

T +44 (0) 20 7422 7600
F +44 (0) 20 7422 7601

london@spacesyntax.com
www.spacesyntax.com

Contact for further information

Alain Chiaradia
a.chiaradia@spacesyntax.com

Team
Alain Chiaradia
Theodora Antonakaki
Christian Schwander
Dominic Honeysett
Juliette Thomas
Francisco Bosch

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rationale and evidence for proposed centres
evidence for proposed centres

In this section we give spatial planning evidence for the proposed centres

- all the proposed centre contribute to complete LBTH centre hierarchy to provide access to centre for all (see map in appendix 4)

- all proposed centre have a cluster of live land uses activities found in centre locations

- all the proposed centres have already good to excellent PTAL

- all the proposed centres have good micro and meso spatial centrality levels which are comparable or superior to existing centres in LBTH

- the centre are part of the spatial typologies of centre found in LBTH.

- total population, population density, weekly total expenditure and per capita expenditure are assessed in Appendix 4.

- all the proposed centre are already recognised as place having their own place names
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validating the spatial centrality indexes
Spatial disparity Spatial centrality index validation summary

SPACE SYNTAX – spatial centrality index account for most of the central activities spatial distribution

30% of the spatial network holds
75% clustered non-residential land uses
50% diffused non-residential land uses

LBTH land use map
OS AL2 land use map

Clustered non-residential land use data
Diffused non-residential land use data

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LBTH Town Centre Spatial Strategy  LBTH

Spatial disparity and spatial centrality analysis A1  Draft 03
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Spatial disparity Spatial centrality index account for most of spatial disparity in LBTH

19% of the spatial network holds 75% of stations (Train, Underground and DLR)

Path overlap – 10,000 m range

19% of the spatial network holds 76% of bus stops

Path overlap – 10,000 m range

19% of the spatial network holds 53% of cycle route

Path overlap – 10,000 m range
Urban baseline How much of AL2 land use is captured by Transport and Top 30% spatial centrality index (60m buffer from road centre line)

% Land use in Transport Buffer zone

640 m from bus stop
960 m from Rail/DLR Underground

AL2 intersection with top percentage of ITN 800 m

Top 10% Top 20% Top 30%
26 39 49

AL2 intersection with top percentage of ITN 2,000 m

Top 10% Top 20% Top 30%
29 40 50

AL2 intersection with top percentage of ITN 10,000 m

Top 10% Top 20% Top 30%
26 39 48

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Spatial disparity and spatial centrality analysis A1 Draft 03
Urban baseline How much of Council land use is captured by Transport and Top 30% Route choice at 60m buffer

% Land use in Transport Buffer zone

640 m from bus stop
960 m from Rail/DLR Underground

Council Data intersection with top percentage of ITN 800 m

Council Data intersection with top percentage of ITN 2000 m

Council Data intersection with top percentage of ITN 10,000 m

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Spatial disparity and spatial centrality analysis A1 Draft 03 10
Urban baseline Spatial centrality analysis of ITN Road Hierarchy in Tower Hamlets

Percentage of All Road

A, B and TLRN roads make up 18% of the whole network. The graphs to the left show the percentages of A, B and TLRN roads from their respective overall percentage.

A Rd  | B Rd  | TLRN | Other
---|---|---|---
35 | 47 | 22 | 9

Top 10% of 800 covers 9% of the network

A Rd  | B Rd  | TLRN | Other
---|---|---|---
48 | 71 | 41 | 19

Top 20% of Ch800 covers 19% of the network

A Rd  | B Rd  | TLRN | Other
---|---|---|---
59 | 87 | 62 | 30

Top 30% of Ch800 covers 30% of the network

A Rd  | B Rd  | TLRN | Other
---|---|---|---
98 | 100 | 90 | 100

Top 20% of Ch10,000 covers 19% of the network

A Rd  | B Rd  | TLRN | Other
---|---|---|---
73 | 37 | 92 | 9

Top 10% of Ch10,000 covers 9% of the network

A Rd  | B Rd  | TLRN | Other
---|---|---|---
98 | 80 | 19 | 19

Top 30% of Ch10,000 covers 30% of the network

A Rd  | B Rd  | TLRN | Other
---|---|---|---
82% ITN | 4% A Rd | 6% B Rd | 8% TLRN

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Spatial disparity Spatial centrality index account for most of spatial disparity in LBTH

ROAD HIERARCHY

TLRN, A & B = 19% of the ITN

19% of the road hierarchy spatial network holds 70% of the traffic (estimated) with variations from 13 to 70 times

SPACE SYNTAX – spatial centrality index

19% of the Space Syntax spatial network holds 80% of the traffic (estimated) with 80% of variations accounted for

Path overlap 9th decile covers 11% of the ITN network

Path overlap 8th decile covers 23% of the ITN network

Path overlap 7th decile covers 34% of the ITN network
Bus Stop location – 9th 8th 7th decile – micro centrality index – 800 m, 10 min walk

Percentage of bus stops in Top 10, 20, 30%
Bus Stop location – 9th 8th 7th decile – meso centrality index – 2,000 m

Percentage of bus stops in Top 10, 20, 30%
Bus Stop location – 9th 8th 7th decile – macro centrality index – 10,000 m

Percentage of bus stops in Top 10, 20, 30%

Top 10% Top 20% Top 30%
Public Transport Accessibility Level Existing and proposed centres

proposed centre and extension have already good to excellent PTAL

- Current centres
- Proposed centre and centre extension
- 9th decile micro spatial centrality index
- 8th decile micro spatial centrality index
- TLRN
- A road
- B road

PTAL
- 6b: Excellent
- 6a: Excellent
- 5: Very Good
- 4: Good
- 3: Moderate
- 2: Poor
- 1b: Very Poor
- 1a: Very Poor
- 0: No Access
Spatial centrality analysis PTAL and 9th & 8th Decile – micro 800m or 10 min walk

proposed centre and extension have high level of micro centrality and good to excellent PTAL

- Current centres
- Proposed centre and centre extension
- 9th decile micro spatial centrality index
- 8th decile micro spatial centrality index
- TLRN
- A road
- B road

PTAL
- 6b: Excellent
- 6a: Excellent
- 5: Very Good
- 4: Good
- 3: Moderate
- 2: Poor
- 1b: Very Poor
- 1a: Very Poor
- 0: No Access
Spatial centrality analysis PTAL and 9th & 8th Decile – meso 2000m

proposed centre and extension have high level of meso centrality and good to excellent PTAL

- Current centres
- Proposed centre and centre extension
- 9th decile meso spatial centrality index
- 8th decile meso spatial centrality index
- TLRN
- A road
- B road

PTAL
- 6b: Excellent
- 6a: Excellent
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Spatial disparity - centres and land uses spatial distribution – macro overview diagram

<table>
<thead>
<tr>
<th>central activity zone</th>
<th>caz fringe</th>
<th>inner city</th>
<th>outer city</th>
</tr>
</thead>
</table>

The 'centre' of a settlement, whether city, town or village, usually means a concentration and mix of land uses and activities in a prominent location. At any point in time, it is usually fairly clear where the centre is and what its limits are. However, the need to revitalise the centres of towns and cities, has drawn attention to how little we know of the processes by which centres are generated and sustained. Historically, it is clear that centres not only grow and shrink, but also shift and diversify, and with growth to a large town or city level, a whole hierarchy of centres and sub centres usually appears diffused throughout the settlement. The challenge is to understand centrality as a process, rather than to describe it as a state. Centres can also diversify with growth, and the tendency to functional specialisation of sub areas that we find in historic 'centres' can, in larger cities, become spatially distinct centres for different types of function. Through the everyday process of path selection behaviour and their different modal ranges we have shown that well defined spatial factors would play a critical role in the formation and location of centres, and then play an equally critical role in developing and sustaining their vitality. The process works through the impact of spatial configuration on route choice preference patterns, and the subsequent influence this has on land use location choices, and the development of the area as an 'attractor' in the settlement layout as a whole. A proper understanding of these spatial factors and the processes they set in train is vital to any programme for the revitalisation sustaining or long term development of centres.

Live centre location, urban layout design

Macro spatial centrality indexes

The diagram on the left show an idealised distribution of centres. From neighbourhood to district in outer city, to inner city, to city fringe to main city. The idealised geometry of successive circles show a very intelligible hierarchy at odd with the complexity of the spatial distribution of centres observable in London (see on the right). In this idealised case, the idea of centre is that for each level of the hierarchy centres are in the middle of their surrounding neighbourhoods. The centre are the space that are the closest to local catchment, and so on up the centre hierarchy. In this idealised case a spatial centrality index is then the distance from the centre.

In London, the spatial pattern of centre is far from this idealised case except for the Central Activity Zone which is effectively the centre of the GLA area, yet with an historical north of the Thames bias. At the micro-meso spatial scale, in London, most of the centre have a linear spatial layout aligned on main arterial. The reality of spatial centrality seems to follow a logic which is not as apparent as in the idealised diagram.

The first issue addressed in this report is as follow:
- given the spatial distribution of centre in London spatial layout can we use spatial centrality index to evaluate spatial centrality at macro scale.
- in order to be validated the spatial centrality index will have to be shown to account for the location of centres and other central function like access to public transport and main arterial routes.

Towards an Urban Renaissance – Urban Task Force – 1999 p. 53

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and spatial centrality analysis A1 Draft 03
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Spatial disparity - London centres and land uses – LBTH centres macro overview
Spatial disparity - centres & land uses spatial distribution – meso/micro overview diagram

Spatial layout design of centre & local context

Centre local catchment

The socio-economic make up of an area and its cycles are important. The socio-economic profile of centre local catchment will have positive or adverse impact on employment, income level, disposable income, total expenditure, mobility pattern and shopping and other central activities patterns.

In order to distinguish the socio-economic impact from spatial centrality impact we need to analyse per se the role of urban design in enhancing or inhibiting ‘live centrality’ at all levels of settlements from macro to meso and micro. ‘Live centrality’ means the element of centrality which is led by retail, markets, catering and entertainment, and other activities which benefit from central location.

At first sight, understanding centrality in towns and cities does not seem to be problematic. Both spatial and functional aspects seem clear and stable: a historic high street or market square as a focus, perhaps, and a concentration of urban functions that have grown up around it to create a central area. Typically, a centre would be marked by a focal ‘live centre’ of markets and retail, with quieter zones of administration, business, education and religion and other civic uses in close spatial proximity defining the limits of the central area. All we would need know to understand centrality in such cases would be to identify the focus, describe the limits and map the various functions in their locations.

Meso-micro spatial centrality indexes

As soon as we take time into account, we find that centrality is often neither clear nor stable, either in its focus or its limits. Although in many settlements the location and limits of the centre do remain more or less in the same place over long periods, in others the centre not only expands or contracts, but may also shift its focus. Centres can also decay because other centre competition, technological changes in transport provision and facilities and population socio-demographic profile.

As shown on the left diagram at meso scale centre are the locus of main route, public transport service access points.

At micro scale, centres can be defined as complexes of interdependent facilities, so that if you come to use one, it is easy to use others. The criterion for whether or not a development would be ‘part of the town centre’ reflects this interdependence: if people come to use this, will they also use other facilities in the centre? Whether or not interdependency is effective depends on inter-accessibility: it must be possible to get from any facility to any other by a quick and easy route which stays within the town centre and which itself is lined with town centre facilities to maximize natural access to all facilities.
In a town centre, in short, it must be possible to search, explore and find, and the basic rule is that wherever you get to, you can still find an easy route to anything else you want to visit without going back on yourself over the same route. Inter-accessibility should also be reflected in the pattern of access to the centre: whichever direction you approach the centre from, the whole centre should quickly make its inter-accessibility available and obvious. The effect of this will be that although bits of the centre grow out along these routes to some extent. As the centre grows linearly the extremities are getting further and further away from the centre: Moving “up and down” the high street become cumbersome. If convex growth of the centre is allowed a second kind of experience is available “moving around” which relates all origins and all destinations within that area. This type of movement is essentially convex in form, and optimally generates not quasi-linear sequences of a street connected by obtuse angles but quasi grids, in which street intersect approximately at right angles, and continue to form other quasi-right angle intersections with other street. Strict land use policy will inhibit these processes.

The overall shape of a centre is thus a “compact convex” shape like a potato with spikes: a `spiky potato’ as it can be seen on the previous diagram.

Meso and micro spatial centrality indexes should identify a series of quantifiable spatial characteristics reflecting inter-accessibility which peak in the live centre, and fall off towards the edges of the settlement. From a spatial point of view, then, centrality seems to be a product both of the overall configuration of the grid, which decides where the centre should be at macro level interacting with meso and micro spatial layout of local processes of urban adaptation and intensification.

In LBTH the centres have grouped in a typology that reflect their overall spatial layout design.

**Contiguous and pervasive centres:** centre have blurred edges and are located in close proximity of each other (pervasive) or in close configity (contiguous). These spatial configuration of centre can be found on the central activity zone and on its fringe.

**On line centres:** located on main arterials such as the strategic Road Network. These location are advantageous in term of multi-scale accessibility and visibility yet bring the problem of coordinating harmoniously the various mode speed.

**Off line, on line centres:** located just off main arterials, on a linear street these centre provide both accessibility and visibility and a better environment for pedestrians.

**Off line pod centres:** pushing the previous type to the extreme, this in town out of town spatial layout: the shopping mall, the big box retail park with sometimes the great advantage of very good public transport provision but poor wider local context pedestrian experience.

**Spatial disparity and spatial centrality analysis**

- Contiguous pervasive
- On line, linear
  - Wentworth Street CAZ
  - Bethnal Street D
  - Roman Road East D
  - Roman Road West D
  - Whitechapel D

- Off line, On line linear
  - Chrisp Street D
  - Watney Market D
  - Wentworth Street CAZ

- Off line pod
  - Canary wharf M
  - Crossharbour D

Few neighbourhood centres are set as

Off line, On line:
- Barkantine Estate
- Strowley Walk
- Castalia Square
- Westport Street

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From absolute distance to relative proximity, from relative proximity to relative legibility
Spatial disparity What is a spatial centrality index – absolute proximity ranking

1) From Lowes Train Station

2) From Victoria Hospital

3) From Lowes Police Station

4) From Tesco

Phoenix Quarter
● Key Service Location

Actual Walking/Cycling Distance
- 400m (5min walk, 2.5min cycle)
- 800m (5min walk, 2.5min cycle)
- 1200m (5min walk, 2.5min cycle)
- 1600m (5min walk, 2.5min cycle)

Metric Isochrones – Corw fly
○ 400m
○ 800m
○ 1200m
○ 1600m

Open space = complete accessibility
Grid = constrained accessibility
Circular radials = near complete accessibility
Spatial disparity  What is a spatial centrality index – relative proximity ranking

path overlap or betweeness or passability is one of space syntax index of spatial centrality

It is an effect of spatial layout design: urban form

Red    = a large number
Yellow = a medium number
Blue   = a small number
Spatial disparity  What is a spatial centrality index – relative proximity ranking

Case study A  from a regular layout to central intensification

Urban block layout design and permeability

<table>
<thead>
<tr>
<th>Block size area (m²)</th>
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<tbody>
<tr>
<td>0 – 1,600</td>
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<tr>
<td>1,600 – 7,000</td>
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<tr>
<td>7,000 – 12,000</td>
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<tr>
<td>12,000 – 20,000</td>
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<tr>
<td>20,000 – 30,000</td>
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<tr>
<td>30,000 +</td>
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1a. 2a. 3a. 4a. 5a.

Centrality index

1b. 1561 2b.1585 (+1.5%) 3b.1544 (-1.1%) 4b.1528 (-2.2%) 5b.1509 (-3.3%)

Distance

Nearest to everywhere

Furthest from everywhere

relative proximity is the results of block size, shape, alignment i.e. urban design or spatial configuration design

Same network length
Same area
Same connectivity
Same type and number of junctions
Same number of blocks

The only changes are the block layout and the block size

Block size and block layout design have positive or adverse socio-economic outcomes

Case study B  from a staggered connected & distributed grid to a disconnected grid: a pod organisation

Urban block layout design and permeability

6a. 7a. 8a.

Centrality index

6b.1625 (+4.1%) 7b.1606 (+2.9%) 8b.2978 (+91%)

Same network length
Same area
Spatial disparity baseline  What is a spatial centrality index – relative proximity ranking

<table>
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<tr>
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<td>Dispersion</td>
<td>231,888</td>
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<td>Minimum</td>
<td>1,108</td>
<td>1,296</td>
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<td>Maximum</td>
<td>1,981</td>
<td>2,320</td>
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<tr>
<td>Mean</td>
<td>1,599</td>
<td>1,763</td>
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<td>381,016</td>
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<tr>
<td>Minimum</td>
<td>1,540</td>
<td>1,609</td>
<td>1,977</td>
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<tr>
<td>Maximum</td>
<td>3,473</td>
<td>3,486</td>
<td>3,608</td>
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<tr>
<td>Mean</td>
<td>2,168</td>
<td>2,207</td>
<td>2,628</td>
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<tbody>
<tr>
<td>Std Dev</td>
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</table>

Same network length
Same area
Spatial disparity baseline  What is a spatial centrality index – relative legibility ranking

Proximity as distance can be far if there is not legibility

Ease of movement is both proximity and legibility

spatial centrality index
relative legibility and multi-scale range (proximity)

micro  centre local spatial context
        400 m, 800 m, 1,200 m

meso  centre wider spatial context
       2,000 m, 5,000 m

macro  centre borough wide and beyond spatial context
       10,000 m and global
Spatial disparity baseline  What is a spatial centrality index – relative legibility ranking

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<tr>
<td>Mean</td>
<td>1763</td>
<td>1729</td>
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<td>1729</td>
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Same network length
Same area

Spatial centrality index
relative legibility and multi-scale range (proximity)

- micro: centre local spatial context
  - 400 m, 800 m, 1,200 m
- meso: centre wider spatial context
  - 2,000 m, 5,000 m
- macro: centre borough wide and beyond
  - spatial context
  - 10,000 m and global
Spatial disparity Spatial layout density and population density

Spatial layout density gives a good account of population density
Spatial centrality analysis potential centre, centre extension, LBTH & OS AL2 land use, rail
Spatial centrality analysis potential centre, centre extension, LBTH & OS AL2 land use, roads
Spatial disparity - centres and land uses spatial distribution – macro overview diagram

spatial planning coverage priority

spatial layout design of centre & wider context

Towards an Urban Renaissance – Urban Task Force – 1999 p. 53
Centres and catchment areas 400 m Existing

spatial planning coverage priority

large gaps

Colour thick lines are designated centres by Tower Hamlets Unitary Development Plan (proposals map, adopted 1998). In light colours 400 m catchment area using census output areas, has been estimated for each.
Centres and catchment areas 400 m Proposed

spatial planning coverage priority
almost full coverage

The figure adds in thick blue the proposed 7 new centres. In light blue the figure shows census output areas within 400 meters catchment area.
TLRN, A, B road 18% of the spatial network holds most of the centres

spatial planning priority management

spatial planning priority place making

most centres are on the SRN

spatial planning policy should embed coordination between transport and place making

Types of Centres

# Major
# District
# Neighbourhood
# Caz Frontage
# Proposed Neighbourhood
= Market

Surrounding Centres by types
# Major
# District

Road hierarchy

- TLRN
- A
- B

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On the move – surface transport and spatial disparities A2 Draft 03
Spatial disparity - centres & land uses spatial distribution – meso/micro overview diagram

Spatial planning priority place making

Spatial layout design of centre & local context

One diagram does not fit all

Towards an Urban Renaissance – Urban Task Force – 1999 p. 56
Spatial disparity - centres & land uses spatial distribution LBTH meso/micro overview diagram

spatial planning priority place making
spatial policy is strategic yet it needs to recognise
the uniqueness of places

If you copy everywhere else, place may become
like everywhere else – and it may not work

In LBTH the centres have grouped in a
typology that reflect their overall spatial
layout design.

**Contiguous and pervasive centres:**
centre have blurred edges and are located
in close proximity of each other
(pervasive) or in close contiguity
(contiguous). These spatial configuration
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activity zone and on its fringe.

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visibility and a better environment for
pedestrians.

**Off line pod centres:** pushing the
previous type to the extreme, this in town
out of town spatial layout: the shopping
mall, the big box retail park with
sometimes the great advantage of very
good public transport provision but poor
wider local context pedestrian experience.

<table>
<thead>
<tr>
<th>Contiguous pervasive</th>
<th>On line, linear</th>
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</thead>
<tbody>
<tr>
<td>Wentworth Street CAZ</td>
<td>Bethnal Street D</td>
</tr>
<tr>
<td></td>
<td>Roman Road East D</td>
</tr>
<tr>
<td></td>
<td>Roman Road West D</td>
</tr>
<tr>
<td></td>
<td>Whitechapel D</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Off line, On line linear</th>
<th>Off line pod</th>
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<tbody>
<tr>
<td>Chisip Street D</td>
<td>Canary wharf M</td>
</tr>
<tr>
<td>Watney Market D</td>
<td>Crossharbour D</td>
</tr>
<tr>
<td>Wentworth Street CAZ</td>
<td>Whitechapel D</td>
</tr>
</tbody>
</table>

Few neighbourhood centres are set as
Off line, On line:
Barkantine Estate
Stroudley Walk
Castalia Square
Westport Street
spatial planning environment  most centres have highest air pollution & noise levels

Pollution Map (GLA, 2003)  Noise Map (Defra, 2007)
Spatial disparity - centres & land uses spatial distribution LBTH meso/micro overview diagram

spatial planning priority place making

devlop for each centre a well connected on line off line good quality public realm

devlop for each centre a spatial diagram that takes advantages of spatial and character asset strengths and mitigate weaknesses

Contiguous pervasive

Wentworth Street CAZ

On line, linear

Bethnal Street D
Roman Road East D
Roman Road West D
Whitechapel D

Off line, On line linear

Crisp Street D
Watney Market D
Wentworth Street CAZ

Off line pod

Canary wharf M
Crossharbour D
Whitechapel D

Few neighbourhood centres are set as
Off line, On line:
Barkantine Estate
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Westport Street
Spatial disparity - London centres and land uses – LBTH centres macro overview

- spatial planning priority place making
- spatial planning priority vitality/viability

Second to major transport improvement what make most difference is urban design within 400-800 m of centre

good urban design impact on good population density and safety

Spatial planing policy should embed coordination between housing spatial policy, DC and centre spatial policy and DC.
spatial planning priority equity

spatial planning priority vitality/viability

spatial planning priority place making

most populous centre have the worst public realm

most populous centre have a high economic value because expenditure density

Centre typology

detailed
Spatial disparity - centres & land uses spatial distribution - meso/micro overview diagram

On line contiguous pervasive centre. This urban form is described in the Urban Task Force as clear urban centre with distinct neighbourhoods. A series of inter-related neighbourhoods around a centre, maximises the number of people within walking distance of the district centre hub. The hub centre must be 'on-line' for viability. Each neighbourhood has its own local facilities at a level that will be viable.

A high degree of mixed use is found in the main centre with some also but to a lesser extent in the surrounding centres. Often there is no identifiable boundary, i.e. fuzzy mingling. Density is graded with higher densities towards the centre of each open cell and more intensive toward the hub centre, the highest densities. In the interstices lowest density uses such as education and small-scale green space are sited. Transport spoke corridors join the different parts to the hub and towards settlements further away.

This organisation that can be seen is the description of radio-concentric urban form of which London is certainly a very good example.

Development & accessibility
Depending on the detail of the urban form connectivity and geometry of the urban realm, accessibility can vary greatly and is often reflected in location variations of mixed uses in the district centres and the local centres with a tendency to optimise both global and local accessibility.

Over time, on line cell development and linear development may evolve into an intensified cluster. These types are abstract, each place is unique, each place at any one time reflects the local geographic, topographic constrains in its historical and more recent development phases. Centrality, the concentration of mix uses activity should been seen as a process, sometimes accelerating sometimes slowing down.

LBTH
In LBTH the CAZ area would be an example of such a spatial organisation. The ground floor active land use pattern is often continuous. It is difficult to establish where a “centre” starts or stops (Brick Lane, Aldgate,) merging into the City of London; the city fringe. In this way, Brick Lane is close to Commercial Road and Commercial Road to Liverpool Street, yet both urban blocks are unusually long, creating marginal separation.

It is as well possible to identify such spatial organisation on the south side of Canary Wharf taking advantage of the water and ownership separation yet in close proximity. The north side of Canary Wharf while much impeded by infrastructure barriers and a much less attractive environment probably possesses some potential.

This of particular importance in relationship to the untapped public transport capacity that exists during the week end.

Adapted from Barton, H 04B Local design for social sustainability
On line, linear centres
Centres are part of the large scale radial and orbital movement corridors. These are along transport, public transport corridors and as well may include transport interchange nodes. We have termed this type of development On line.

Mixed use is found in these higher densities. Facilities are located on the central road corridor with some variation of position. Density is graded down from the corridor.

As an urban continuum, the form could contain populations of between 20,000 – 40,000, covering some 1 - 3 km in length. The linear form is not continuously even but displays the characteristics of a series of fuzzy neighbourhoods, the boundaries of which are dynamic over time.

They may integrate open space. This open land, public space and could also contain a parallel non-congested road bypassing the main central road yet giving intermediate access to it. The central road will have the local traffic slowed down by good access to shops and facilities.

The diagram shows a ‘single strand’ of development but the form can also be developed as a ‘double strand’ along two parallel transport routes. There are high levels of permeability (particularly for non-motorised movement) between the neighbourhoods (deformed on a line cell grid).

Consolidated linear development often arises historically from what was at first primarily a linear built form organisation.

Linear form can be as glamorous as the Champs Elysee in Paris once regenerated; double lined trees on both sides, expansive pavements, underground car park, high quality public realm, high public transport provision, yet with a daily 100,000 vehicles passing by. In London recent example of good linear development regeneration include the South Kensington High Street flag ship, but more representative of what can done in most London high streets is Walworth Road.

Linear development’s weakness is its strength: linearity. It lacks a fool, good calm public open spaces, green that expands across, redundant, flexible and alternative capacity for the independent when the street is invaded by multiples.

Linear development accessibility
This type of development has often been a transport corridor that in time has been reinforced by different modes of public transport (tramway, buses, underground). For example, in London, early underground lines were built by opening up main roads.

Depending on the detail of the urban form, connectivity and geometry of the urban realm, accessibility can vary greatly and is often reflected in a variety of mixed use locations, which tend to take advantage of location with both macro, meso and micro accessibility.
Spatial disparity and spatial analysis baseline  Summary – strategic spatial form

Off Line On line centres
The underlying concept is to provide identifiable ‘neighbourhoods’. Each neighbourhood is provided with a central focus with higher density and grid intensification (local shops, a pub and often a social element such as a church, community centre or other local public or health facilities). Some cells are designed to be independent and the boundary does not allow much movement in or out. The term ‘closed’ neighbourhood described this condition (off line interconnection).

Access is usually via two or three access roads from main distributors. Alternatively, the cell and its central facilities lie on the main distributors, i.e. ‘on-line’ interconnection development. This increases the viability of its central shops and service and such an ‘on-line’ cell may act as a district centre.

As the cell has to function as a neighbourhood there is less size variety than that found with pods. In order for the central functions to be viable the minimum population is taken as 4,000.

The upper end of population is determined by accessibility (10,000). For viability, the local centre needs to be within approximately 10 minutes walking distance from most of the catchment ‘customers’. This equates to 800m walking distance.

In dense urban areas Off line / On line cells will be embedded in the urban continuum. As such they are not completely Off line nor On line. This spatial organisation has often been developed post 1945 as transport mode separation design was the flavour of the time. A lot of housing estate replacing historical fabric has unsurprisingly kept the existing spatial layout, excluding Environmental neighbourhood take this form of organisation when through traffic has been eliminated. Another instance is On line historical street made Off line by mean of full pedestrianisation or time traffic management measures.

Development accessibility
This type of development is a mixed use elaboration of the previous type where the on line cell preceded the off cell development. If accessibility within each cell can be developed to support sustainable modes of transport, the accessibility between cells is often limited to modal separation and raises problems of proximity and safe accessibility at all times. It is often difficult to provide efficient public transport. It also creates difficulty for chaining pick and drop off for transport on demand.
Off line pod development is typified by almost single use sites, with no interconnections, accessed by one or occasionally two roads coming off a main distributor road. The pod is never on a main distributor; we have termed this ‘Off-line’ development. In this case Off line pod.

Uses are mono-functional, they can be entirely residential, business, education, leisure or retail. Retail and leisure can sometimes be found together in a single site. Edge of town land availability, market forces, cheap car based transport and planning policy led to a lot of this kind of developments in the latter quarter of the last century. It is still a dominant urban form for new built environments. This form has become the most prevalent, in that it can be found in the widest range of scales and sizes, sometimes in dense urban areas, most of the times in their outer edge. It has resulted from the congruence between real estate search for management simplicity and maximising ROI (economy of scope and of scale) and zoning planning and transport planning, as it is easy to handle within transport modelling that required zones to be of similar uses.

Single pods can be anything from 1ha, a small residential development of 20 houses, to 500ha, a large business park campus. Since the pods are designed as independent developments, they can be found as one-offs, e.g. infill developments, or spread over a wide area often as a district-wide edge of a town development.

Market forces play a very strong role in determining the pod. Attributes such as size, density, access, building type, land use are market led. Socially driven agendas such as provision of public open space, community facilities, quality of the public realm are only addressed where regulation dictates or local planning places constraints. Environmental performance issues tend to be driven by regulation.

Pod development accessibility
This type of development can increase very significantly the adverse impact on average trip length and legibility (urban grain size is vast, shape and configuration are dictated by other considerations rather than good urbanism like floor plate size, car parking, or servicing). It does not valorise sustainable modes of transport such as local walking and cycling.

Ease of movement
Macro, usually good by car, public transport provision will be a variable according to urban location.

Meso, often poor due to large scale infrastructure that is in close proximity to ensure large scale macro movement.

Micro, depending of the scale and design, it aims at enclosure and exclusivity. Depending on the location it might be good just within the development but not beyond.
How is spatial centrality measured?