

# Designing the Inclusive Journey Environment

## Introduction

This paper reports on an inclusive design research project, AUNT-SUE (Accessibility and User Needs in Transport) under the EPSRC's Sustainable Urban Environments programme ([www.londonmet.ac.uk/aunt-sue](http://www.londonmet.ac.uk/aunt-sue)). The challenges of assessing and measuring the local journey environment are discussed with regard to the development of a street audit index. This focuses on the "whole journey environment", since as Coleman notes: 'A journey can be seen as a chain of individual products and services whose accessibility is only as strong as its weakest link' (in Clarkson et al., 2003:132). In particular, perceptual and safety issues, since these present one of the major barriers to transport access for vulnerable groups - over 11% of the public would travel more if they felt safer on the transport system (DfT, 2004, Crime Concern, 2002).

In the context of the whole journey environment, "design" (or the absence of) is traditionally a barrier to transport inclusion (Azmin-Fouladi, 2005), but also a potential facilitator for creating accessible and inclusive street environments.

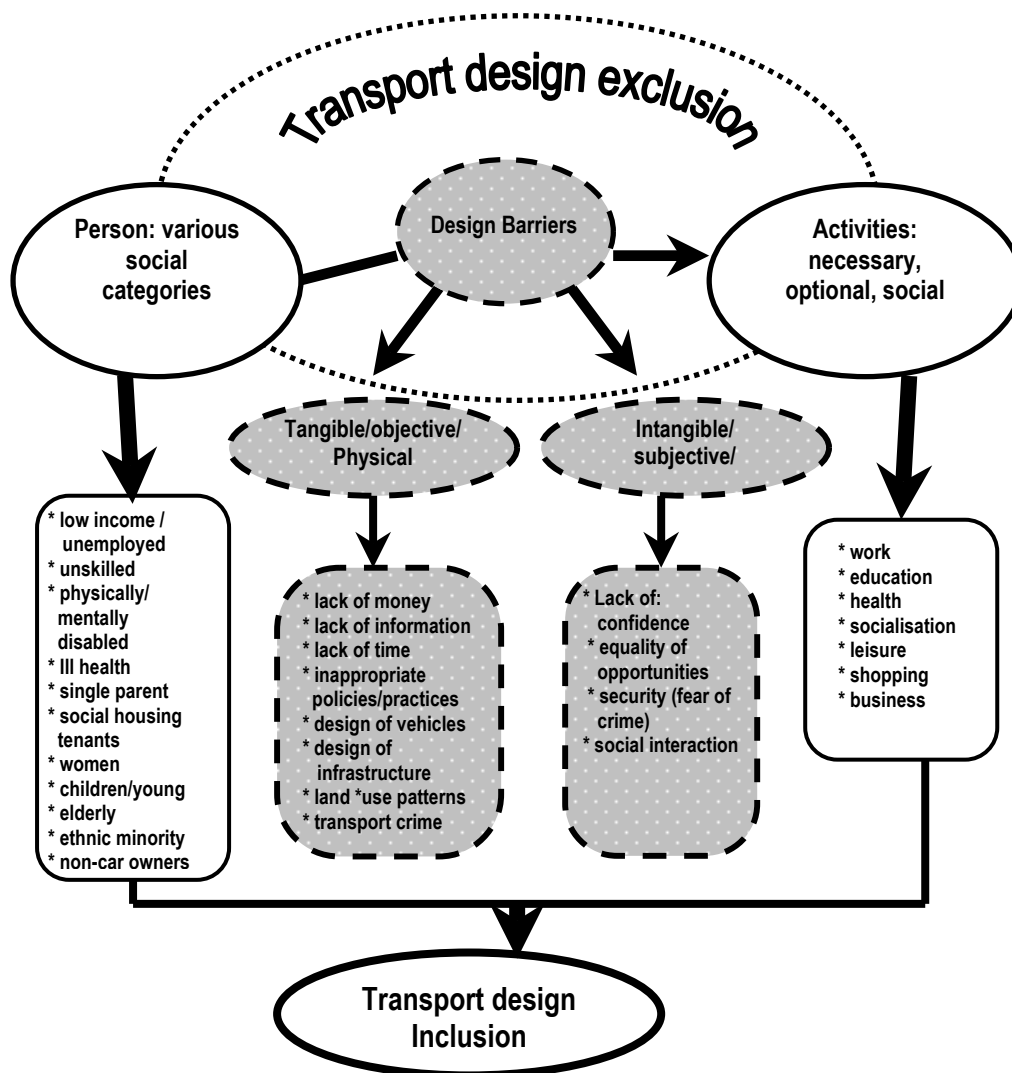


Figure 1. Whole Journey Environment Chain

An important part of achieving an inclusive and accessible journey chain therefore depends on the design quality of the transport facilities, interchanges and walking environment (Azmin and Evans, 2005). It is now widely accepted that: 'Matters such as community safety, accessibility, sustainability, quality of life and protecting the heritage legacy, are key concerns within the public realm and are significant elements within the urban design agenda.' (City of Edinburgh Council, 2003: 7). Whilst the availability of accessible transport/public facilities and local job opportunities forms the backbone of accessibility planning and sustainable communities strategies (ODPM, 2003), without a well-designed public realm that supports origin to destination journeys, such strategies are likely to fail to deliver long-term accessibility and social inclusion goals (Lucas, 2004 and see Fig.1. above).

Extensive research evidence (Azmin, 2005) shows that good urban design can contribute to an "inclusive journey environment" in three key aspects - by helping to

- i. enhance the quality of the public realm (including transport interchanges and the pedestrian environment); create a sense of identity/ community by animating the edges of the routes and creating vibrant public spaces
- ii. minimize the psychological barriers to accessibility, e.g. fear of crime, by reducing opportunities for physical and social incivilities and risk
- iii. to reduce physical barriers to accessibility by providing permeable public spaces, pedestrian friendly landscaping and useful street furniture and amenities (e.g. seating, lighting, WCs, cycle parking).

In order to identify design-related barriers to achieving an inclusive journey environment, the quality of the physical environment must be thoroughly analysed. It is however impossible to comprehensively specify what such an analysis should include, since each of the above aspects requires their own sets of variables; each street and square has their own unique characteristics and must be considered individually. In addition, many features of the physical environment that represent each of the above aspects both can potentially overlap and conflict. For example, well designed buildings in a neighbourhood can enhance the quality of public realm and reduce the perceived danger in the area (an overlap of features that create key aspects i. and ii.), whilst a multi/split-level and green landscaping which can elevate the image of the public realm, can also create both actual and perceived barriers for accessibility (a conflict between features that constitute key aspects 1 with key aspects ii. and iii. This raises questions of which features should be audited, at what level of detail should this audit be conducted and, above all, is there a coherent method of street auditing that fits the purpose of our research into accessible and inclusive transport

Considering the above, this project is intended to pilot an urban design street audit that comprise all aspects that contribute to accessibility, which could then be used for modelling and to develop a GIS tool for urban design and accessibility analysis. In this respect, this paper firstly explains the research methodology and clarifies difficulties in street auditing for urban design and accessibility interaction, and illustrates the attributes of the features that have been audited. In the second section, the method of data collection within the test bed areas will be described and in the final section, data analysis for the test bed areas will be presented.

## **Methodology**

### **Limitations**

Urban design is a practice that combines art and science because it mixes structure, function and "delight". The structural and, to a great extent, the functional aspects of urban design practice have measurable properties allowing scientific analysis of their qualities,

however the delight aspect is immeasurable (or at least less tangible) and its analysis is very much based on subjective evaluation. As Douglas and Wildawsky (1983, in Adam *et al.*, 2000, 52) call it: an 'aesthetic judgment' which is mainly based on 'feelings', 'imagination' and 'sensation'. As Jane Jacobs also maintained: 'A City cannot be a work of art' (1961, 372). This characteristic limits research in the assessment of urban design outcomes in a scientific and transferable manner. Whilst many disciplines such as sociology, psychology, economics and so on have a long-established history of methodological approach for scientific investigation, for planning and design professions such approaches are generally absent. City planning is so different from what we conventionally view as art or even 'artistic process' that 'it is difficult at first for contemporary planners to pinpoint the connection' (Talen and Ellis, 2004, 11). In consequence, as Taylor argues, design fields are prone to practice quasi-science, adopting the language or position of other environmental disciplines with more experience in research (Taylor, 2002, 93).

The lack of a coherent urban design method of data collection and analysis is further demonstrated by reviewing the relevant literature and guidance (e.g. ODPM, CABE, English Partnerships, Building for Life, Urban Design Alliance *et al.*). This reveals inconsistencies in both the level of detail that urban design methods and techniques should deal with, and the way design principles and guidance should be applied. In addition, Government's expanding design advice, guidance and briefings are generally produced for the design of new developments (design codes, new build) without suggesting criteria and ways by which the existing urban fabric could be analysed and improved (Coleman, in Clarkson, *et al.*, 2003). Above all, few have viewed urban design in the context of an inclusive journey environment. Although approaches like 'Living Street', 'Placecheck' and 'Design Quality Indicators' each have provided checklists for evaluating the quality of public spaces and building forms from a user's point of view, their methods of data collection are rather ad hoc, and often lack consistency. The strength of these methods however is that they mobilise users to participate in the process of data collection and identifying problems. This ultimately reflects real life situations where users confront a problem and report it, but they do not provide a coherent tool for analysing the built environment in various contexts. In addition, these methods create various complexities for researchers involved in assessing urban design qualities, some of which are listed below:

- Each person who undertakes the street audit has different needs and abilities; a barrier for one might be opportunity for another. This would make it difficult to identify general features of the physical environment that might create or remove barriers to accessibility.
- These methods provide piecemeal and short-term solutions, without necessarily examining the causes of the problem, e.g. they suggest removing graffiti, however such action does not, in itself, remove fear of crime, if it is not coupled with the reason as to why graffiti was there in the first place (e.g. a lack of natural surveillance; the existence of an abnormal setback or the high number of teenagers in the area), each of which requires different approaches and hence solutions).
- Most methods concentrate on physical/measurable barriers that individuals encounter when walking or getting onto public transport, and are only concerned with the conditions of footways/crossings (which are generally in the realm of street/traffic engineering); overlooking boundary treatments, façades and buildings with features that might have negative psychological effects (e.g. high/dense bushes, abnormal setbacks, boarded up/vacant buildings and sites).

Undeniably, each tool mentioned above can make a valuable contribution to identifying accessibility problems of individuals belonging to a specific social or 'ability' group within a short stretch of a pedestrian route. However, they fail to provide a consistent criteria for the quality assessment of urban design and accessibility on a neighbourhood or city-wide scale, and that could be reconciled with the majority of excluded individuals needs. Considering the limitation of measuring 'delightful' aspects of an urban environment, the question is raised as to what tool we can develop that could help urban designers deliver an inclusive journey

environment? Our approach seeks to provide a general framework for conducting a street audit, embodying both measurable and perceptual elements of the public realm, which reflects accessibility and users' tangible and intangible needs in transport. Such an appraisal can then be used to identify urban design-created barriers, and suggest ways in which they can be improved to meet a greater number of users' needs.

## Our approach

As explained above, measuring perceptual properties of the physical features of the environment, which is generally in the domain of psychological investigation, poses immense difficulty in setting criteria for urban design and accessibility appraisal. Studies that address "fear of crime" or promote "good urban design", do not tend to specify the categorisation and measurement of intangible attributes. For example, there is no standard for the numbers or type of windows that create a well-overlooked route, or the kind of boundaries (height, material and design) that contribute to the enlivening of the footway edges. This is partly because most design policies and guidelines provided by government (Better Places to Live: By Design, 2004; By Design: Urban Design in the Planning System, DETR, 2000; and the Urban Design Compendium, 2000 - and other related guidelines) are primarily intended for new development and concerned with general quality rather than specific elements.

Detailed design is expected to be justified within the design statement prepared by applicants which then could be adapted and negotiated later, thus there has never been any need or mandate for indicating detailed design principles in related documents. In addition, studies that deal with good urban design, designing out crime and transport related issues tend to overlook other discipline's perspectives when setting out criteria for best practice, e.g. studies that address the pedestrian environment from a traffic engineering perspective fail to address fear of crime and public space, or those concerned with safety, neglect the physical accessibility issues (e.g. alley-gating, removal of setbacks). With a lack of standards and norms for categorical/descriptive attributes of a particular physical feature, and an incoherent set of criteria for inclusive journey environment, it is likely that the number of variables reflecting these elements become significantly diverse and present difficulty for analytical and operational purposes.

Furthermore, identifying perceptual variables including elements that contribute to the fear of crime, sense of place/identity/ownership, community cohesion and place attachment, requires wide-scale public consultation. Such qualitative approaches, without *a priori* categorisation of constituent physical elements, would pose immense difficulty in managing and analysing data. However, with current developments in IT and digital design, especially Geographic Information Systems (GIS), a database and analytical tool has enabled us to construct a general framework that supports both professionals involved in spatial analysis, and lay persons/end-users to evaluate urban design outcomes in a consistent and comparable manner. GIS spatial data analysis allows a diverse set of geographic and geometric data and multi-criteria to be overlaid and problem areas to be identified.

Combined with related visualisation capabilities (CAD-GIS), it then allows individuals to interact with the physical environment virtually and modify it in situ as they pass through various routes, and via digital and printed maps. This is emphasised by Batty *et al.* (1998, 3), who consider urban design, rather than urban planning and architecture (both have long established interface with GIS and digital technology), as the best candidate for GIS application because: 'Urban design is small-scale enough for many users of urban environments to feel its impact. It is sufficiently broad-based in its influence on those affected that the wider public always have some view of how it might best be carried out. It is less abstract than city planning which exists at larger scales and more populist than architectural design which is remote from those with no formal artistic and engineering training. As such,

urban design has the greatest potential of any technologies or practices for involving experts and lay-people’.

In this respect, our methodological approach consists of four stages:

1. Creating a design index reflecting both the quality of the walking environment and personal safety-related physical features;
2. Identifying hot spots of fear and poor quality public spaces by the way of auditing test bed areas against criteria set out in the previous stage;
3. Administering semi-structured questionnaires to excluded groups in order to identify their overarching accessibility barriers, supported by a map of the area under investigation and a series of photo images showing various features of the built environment previously identified as problematic or ‘risky’, enabling a correlation between the findings of the audit and mapping, and people’s perception and everyday experience;
4. Gaining insights about the psychological and physical barriers to accessibility by way of conducting in-depth interviews and forming focus groups with residents, users and targeted excluded groups. At this stage, the participatory potential of the GIS tool will be tested by way of presenting images of the areas and routes where individuals can interact with and modify the representation of physical environment.

In the next section, the creation of the design index and the elements of the street audit are presented.

## **Design index for inclusive journey environment**

The aim here is to develop an urban design index for accessibility (UDIA). As mentioned above, urban design contributes to the inclusive journey environment through three key aspects: ‘quality’, ‘safety (fear of crime)’ and ‘physical accessibility’. Of these three aspects, research into ‘physical accessibility’ is being conducted by transport/civil engineers in the AUNT-SUE testbed study team (Imam, 2006). Thus it is with the two remaining aspects that the urban design index is concerned, although access to buildings and footways/paths are also considered in the urban design audit. It could be suggested that the conflict and convergence of these aspects creates difficulties in delineating features that contribute to each key aspect. For example, in appraising the quality of the public realm, attention is paid to the façades from an urban design point of view (e.g. sense of continuity, character and enclosure), whilst the minimisation of fear of crime centres on anti-social behaviour (graffiti, vandalism and natural surveillance). Combining these variables together depends on the sound conceptualisation of good urban design in the context of an inclusive journey environment (see Azmin-Fouladi, 2005 for the theoretical framework of our approach).

In creating the design index for street auditing, by reviewing relevant literature (Figure 2.) attempts were made to choose criteria that can be measured and also to provide a set of defining attributes, rather than general descriptions. Where such definitions as in the case of intangibles were missing, based on observations and in consultation with other researchers, they were defined more concretely.

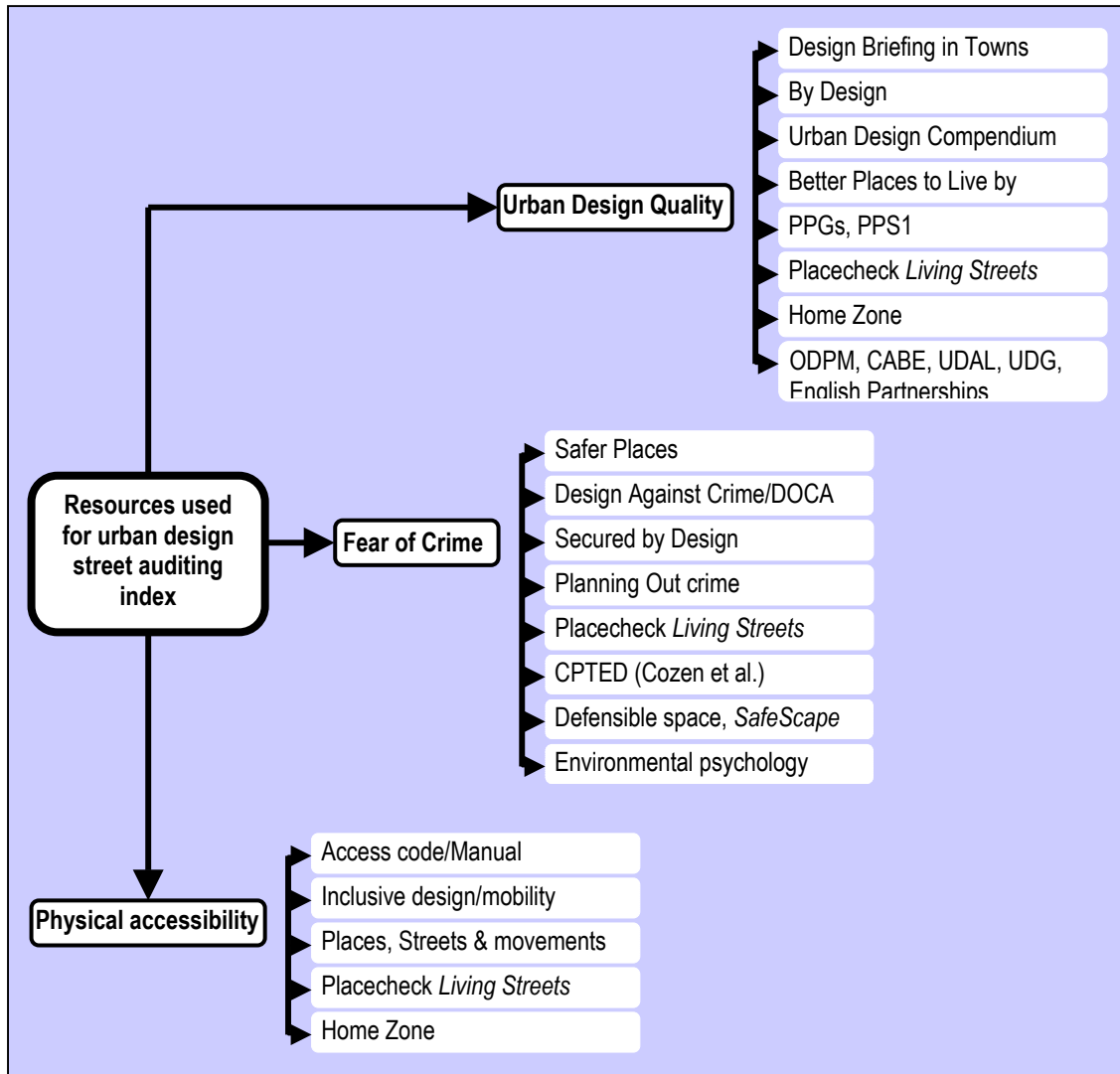


Figure 2. Sources for Urban Design Index

The auditing itself is conducted in two stages. Firstly the macro-elements will be audited, as listed below and conceptualised in Table 2.

- **Land-use** (office, residential, commercial, occupation/usage, temporal, mixed-use)
- **Windows** → Reflecting natural surveillance
- **Active frontage** → Reflecting natural surveillance
- **Walls/boundaries** → Reflecting territoriality/sense of ownership/access control
- **Set-backs** → Reflecting territoriality/sense of ownership/access control
- **Public space management** (graffiti, vandalism, fly-tipping, litter and other physical incivilities)
- **Street furniture** (seats, bins, bollards, tree grilles, railings and obstacles)

Table 2. Conceptual categorisation of urban design elements for street auditing

Concepts/aspects		Elements/variables/cases/values
Natural surveillance	Windows (eye on the street)	Both sides (Numbers) One side (numbers) No windows/blank walls/bushes and green areas
	Activities on the footway	Shops, places of business (frontage) Gathering places (Benches /children's play area) Street market (occasional activities)
General image	Broken windows	Graffiti /vandalism Bordered up buildings/broken windows Rubbish/general cleanliness
	Territoriality	Set backs Demarcation of public/semi-public/private Enclosure/continuous building frontage, proper height-width ratio
	Fear based route configuration	Entrapment (width of the footway) Blocked prospect /open sightline Bushes and grown up plantations
	Special features	Local characteristics/identity Landmarks and historical buildings/features
Physical barriers	Accessibility to buildings	Level entry Ramp Step(s)

As is emphasised in 'Better Places to Live', the individual elements of buildings, landscapes and their interface, have a key role in determining the overall quality of an area. However, auditing all these elements for a wide area is time consuming and impractical. Thus after identifying sections of public spaces and routes within our testbed area which exhibit negative qualities, in the second stage, micro-elements such as design of railings, treatment of boundaries and appearance of shopfronts, will be examined thoroughly. Some of the features considered to be most influential include:

- Design and arrangement of boundary walls/railings/plantings;
- Planting (trees, planters, grassed areas, flowers and borders);
- Banners and signs (interpretative, instructive, informative and directional);
- Lighting (pavement, pedestrian, highway, security, building and feature);
- Public art and features (permanent & temporary works, fountains and graphics);
- Shop fronts (thresholds, glazing, stall risers, signs, banners and shutters);
- Advertisements (hoardings, kiosks and banners, signage);
- Safety and security (emergency equipment, CCTV, gates and grilles);
- Elements that signify identity and character

## Index for street auditing

A total of 30 indicators representing the prime macro-elements were identified and assessed by the research team - see Table 3. These elements were captured in an observational audit and mapping (manual and digital-GIS) of Somerstown in the London Borough of Camden (St Pancras Ward). A deprived neighbourhood, with low car ownership, a high number of school age children and a mixed, multicultural community (e.g. Irish, Bangladeshi, Somali). Ironically - given high accessibility barriers and exclusion - the neighbourhood is bounded by major transport interchanges (Euston and King's Cross St Pancras) and institutions (British Library).

The two elements of 'gate' and 'entry phone', which were originally included in our index (as they reflect secluded and overprotected environments and hence suggesting exposure to crime and exclusion), were not incorporated in the spatial analysis. This is because the majority of (social) housing estates had these elements, so their inclusion would distort the

effect of other variable. 'Cycle lanes' and street obstacles such as 'bollards' were also excluded from the analysis, as they were considered as part of the 'physical accessibility' assessment. These above elements were first recorded onto a hard copy ordnance survey (OS) map (1:500 scale), and subsequently transferred into GIS format, creating a rich database for spatial analysis and visualisation.

Table 3. Macro-elements for urban design street auditing

Elements	Attributes
Access to building	Level entry, ramp, step, steps
Footway width	Narrow <1.5, absolute 1.5m, accepted 1.8m, desired 2m (Essex CC, 2006)
Windows	Lots of windows, some windows, no windows, no ground floor windows
Set backs	Front garden, parking cartilage, access to lower ground, planter>10m wide
Railing	<1.5m, >1.5m height
Boundary plantation	<1.5m, >1.5m ( bushy), planter
Boundary wall	<1.5m, >1.5m
Alleyways	
Listed building	
Land use	National Land Use Database (NLUD) land use classification
Open space	Playground, sport court
Building storeys	Numbers
Shop curtilage	
Fence	
Blank wall	
Greenery	Park, Public as part of walking environment, communal, front garden
Soft boundaries	Change of surface, change of level
Hard boundaries	Barbed/razor wire, wire-mesh
Vandalism	
Seating	
Parking	Off-street
Graffiti	
Gate	
Cycle lane	
Fly tipping	
Entry phone	
Bollards	
Boarded-up buildings	
Vacant/Unused land	
Width of the street	

## Spatial analysis

Contextual data has been collected and visualised in 2D and 3D formats, including land-use, build heights, recorded crime (property, street) - see Figure 3 and 4 below – as well as socio-economic and demographic data from Census (2001) and deprivation indices (2004).



Figure 3. Street Crime Density (2D)

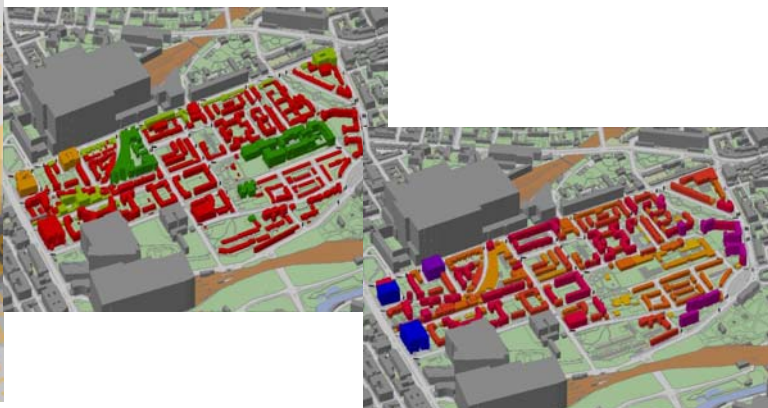


Figure 4. (3D) Land-Use and Building Heights

Primary data collected from the test-bed area was entered into GIS as 'shape files' with their own sets of geocodes. In order to be able to analyse the quality of the public realm for the inclusive journey environment, attributes of each elements were ranked as negative and positive values. For example areas/routes that have a low level of natural surveillance are drawn based on the combination of the following six variables:

- No window
- No ground floor window
- Blank walls
- High fences
- Boundary wall/plantation >1.50m
- Set backs of >10.00m

By using the GIS modelling technique, layers of spatial data were combined to determine areas with potential personal security/fear of crime problems.



Figure 5. Areas with negative qualities for personal safety

The same approach is applied to the quality of urban design within the area, where elements that contribute to negative environmental quality are considered to be a lack of 'enclosure' (inadequate relation between building height and the width of the street), abnormal setbacks and "dead frontage" (DCLG, 2004). By overlaying negative features, a new layer representing analytical data is created. These and other aspects can be further analysed by examining micro-elements where specific problems are identified, and where barriers are expressed by participants in user (and non-user) surveys. These are being conducted with "focus groups", and individuals (face to face and self-completion questionnaire), based on various target, as well as random, groups of residents, after which the GIS-based street visualisations will be refined ("iterative design"), and practical design recommendations made.

These will encompass micro street maintenance and management, and more strategic transport and land-use planning using the Street Audit Index and GIS-Participation technique. This will complement local authority Development Framework (LDF - "borough plan") and Community Strategy exercises, as well as Local Transport Plans, which form the basis of central government funding of transport improvements at a local level, and thereby demonstrate greater social inclusion and access.

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