

Green space in urban morphology: a historico-geographical approach

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Abstract. *Despite the large areas occupied by green spaces in most cities, and the increased recognition of their importance, they have received little consideration by urban morphologists. A sizeable proportion of urban green space occurs in fringe belts. Continuous fringe belts have generally originated adjacent to present or former physical limitations on urban growth, most strikingly next to city walls. Discontinuous fringe belts have much more often come into existence during other hiatuses in urban growth, particularly related to slumps in housebuilding. The findings of research on green spaces in both types of belts are considered in this paper. Attention is drawn to the fact that the significance of these belts for planning, particularly in the case of those not related to physical limits on urban growth, has not hitherto been given the attention it merits. The integration of green-space development into historico-geographical thinking is pursued and its value in research and practice is underlined.*

Keywords: green space, fringe belt, glacis, historical geography, planning

The urban forms that have generally received most attention from urban morphologists are physical structures, notably buildings and street patterns (Lee, 1999; Whitehand, 2017). The *spaces* within which these built structures exist have on the whole received relatively little consideration. This is particularly true of urban green spaces, despite the favourable attention that ‘green infrastructure’ has tended to enjoy more generally in recent decades.

One of the manifestations of this anomaly has been the relative neglect of the significance of urban green spaces within studies of the *historico-geographical* character of cities. While greenery has received a good deal of attention for its ecological significance and the benefits it can confer, little consideration has been given to its place in the morphogenetic structure of urban areas. This is despite the very significant proportions of cities that

are occupied by green space. For example, green-space patches of more than 0.5 ha comprise some 23 per cent of the area of the city of Birmingham, UK (Hopkins, 2012, p. 43). Inter-city and inter-regional comparisons of amounts of urban green space have been made (Fuller and Gaston, 2009; Wenfeng *et al.*, 2015), and broad centre-periphery contrasts within cities have been quantified (Alberti *et al.*, 2001), but, with notable exceptions (for example, Hopkins, 2012), studies of the ways in which green spaces contribute to the historico-geographical structures of cities have been few. Considerations of the implications of this aspect of green spaces for planning have been even fewer. A conspicuous lacuna is in relation to the fringe-belt concept, which in other respects has attracted increasing amounts of research (He, 2018; Ünlü and Baş, 2016).

Fringe belts and green space

It is over 80 years since fringe belts were recognized as extensive zones that formed at the urban fringe during a hiatus in urban growth (Louis, 1936). That hiatus was in most cases occasioned by either a physical limitation on urban growth, notably a city wall or a topographical obstacle, or by an economic impediment to urban growth, most commonly manifested in a protracted slump in residential building. When the urban area resumed its outward spread, the fringe belt frequently became embedded as the growing residential area extended outward into the area beyond it.

Though the amount of green space within a fringe belt varies, particularly in relation to the age and location of the belt, it is generally a dominant feature, even when it has become deeply embedded in a major conurbation. An example is the major fringe belt that by the end of the twentieth century was deeply embedded within Birmingham, UK. Here 'some sort of open space, public or private, much of it vegetated, was a feature of almost the entire fringe belt' (Whitehand and Morton, 2004, p. 277). The fact that the significance of green space within fringe belts has attracted less attention than its extensive presence would seem to justify reflects a number of factors, among which it would seem is the tendency for the features that characterize these belts to often be presented in terms of land use. In keeping with this, Conzen (2009), in his invaluable perspective on fringe-belt studies, provides a list of examples of fringe-belt features. The list, which does not purport to be exhaustive and is subject to changes in fringe belts over time, includes cemeteries, public parks, nurseries/market gardens, allotments, religious retreats, military barracks, college grounds, hospitals, waste disposal plants, golf courses, sports fields, riding schools, transport facilities, factories, and quarries (Conzen, 2009, p. 33). The tendency for these features to be characterized by large sites, and for the intensity of usage in many cases to have increased as a fringe belt has become progressively more embedded in the urban area has frequently been considered. But the proportion of space occupied by

different types of surface, notably vegetated surfaces, has rarely received more than passing mention, despite the ecological significance of fringe belts (Hopkins, 2012).

Arguably one of the reasons for the tardiness with which green-space research and the fringe-belt concept have been brought together has been the intricate character of some of the most influential early research into fringe belts, reflecting not least the relative complexity of some of the cases examined (Conzen, 1960, 1969). In an attempt to shed more light on the green-space/fringe-belt relationship, it is considered in this paper in three parts. First, the focus is on fringe belts that have remained practically continuous, predominantly associated with 'fixation lines' (Conzen, 1969, p. 125), notably defensive zones around cities but also including linear topographical features, waterways and legal boundaries. Secondly, more complex, discontinuous fringe belts are examined: here the influential factors tend to be more diverse, though very commonly a hiatus in the growth of a city's residential area has been a feature of fringe-belt formation. Thirdly, reflections are offered on the relatively little of substance that exists on the role of planning practice in relation to the majority of green-space fringe-belt development.

Continuous green-space fringe belts

Louis (1936) drew attention to the continuous greensward fringe belts that comprised the *glacis* surrounding the medieval and Renaissance walls of Berlin – these open zones ensured that attackers threatening the walls were highly visible to the city's defenders. However, his paper was concerned with much wider aspects of the geographical structure of this city, and it was nearly a quarter of a century before Conzen (1960) made a much deeper study of fringe belts, including one associated with a town wall, in the comparatively small English town of Alnwick. And it was this work on Alnwick more than any other study that was to influence the direction of fringe-belt research over subsequent

decades. Its foremost contribution was in uncovering and conceptualizing change over time. However, it might be argued that in its penetrating insights into fringe-belt processes it did little to attract research into the 'glacis' fringe belts that form such striking green-space zones in many historical cities.

Very recently, Šćitaroci and Marić (2019) have provided an important reminder of the importance of fringe belts associated with city fortifications – a reminder that deserves attention at this time of increased concern with the importance of green space more generally. Their mapping of present-day green space in relation to the present and former walls of 26 European towns and cities depicts the strength of this spatial relationship.

Though nothing approaching an inventory of continuous or nearly continuous green-space fringe belts exists, there is little doubt that those associated with city walls are the most numerous. Among the various land uses associated with or occupying green spaces that Šćitaroci and Marić identified in their research were public and private gardens, walkways, agriculture, archaeological sites, semi-natural vegetation, undefined spaces, natural landscapes, sports grounds and car parks.

Cases of such survivals merit investigation for their historical significance, differences over time and space in attitudes towards them, and the insights they can provide for conservation. Though not previously examined by fringe-belt researchers, a striking case in which green space today continues to follow very closely the extramural zone of a medieval wall is the Swedish town of Visby on the island of Gotland (Figure 1). Here the juxtaposition of the wall as a fixation line and the surrounding zone of green space is almost complete. At present the green space consists largely of grass (Figure 2), except outside the south-west and north-west corners of the walled area where the cover of trees is slightly greater than that of grass.

A very different but also largely continuous green-space fringe belt developed in the different topographical and cultural environment of Nanjing in China. Here, during the great period of Chinese city-wall building of

the early Ming dynasty, a massive city wall 33.6 km in length was constructed, not on a largely fairly flat coastal plain as at Visby but mainly inside the line of a waterway, much of it a river, and also significantly influenced in its alignment by the disposition of hilly and mountainous areas. As is often the case in China, for several centuries the area circumscribed by the wall far exceeded the extent of the city's built-up area. In this case it was only after 1949 that the built-up area extended significantly beyond the wall (Whitehand and Gu, 2017). Since the adding of the wall to the List of Important Historical Sites and Monuments of China under Special Preservation, its line has been re-employed in city planning. Belts some 50 m wide on both sides of the wall were designated as 'Character co-ordination areas' (Compiling Committee for Nanjing Gazetteer, 2009, p. 472), and, since 2003, there has been building clearance within these zones (Whitehand and Gu, 2017, p. 95). A 'greenway' has been designated along its length, including existing parks, semi-natural green spaces and planned parks (Jim and Chen, 2003, pp. 109–11). These developments were roughly contemporaneous with the development of numerous glacis parkland belts elsewhere in China: for example, in Xian in 1983, along two stretches of city wall in Beijing at the beginning of the twenty-first century and at much the same time in Shanghai.

By the nineteenth century the building of city walls and hence the creation of glacis fringe belts was ceasing practically worldwide. Already by this time the replacement of these belts by parkland belts was beginning in the Western world. For example, the medieval city walls in Kraków, Poland had been largely demolished by the early-nineteenth century and a green belt of public gardens and parks was created in the 1820s, replacing the glacis. Comprising 21 ha and nearly 3 km in length, it contained a variety of trees and shrubs interlaced by footpaths (Rožek, 1991). Known as the Planty Gardens, it has survived as a major continuous green space deeply embedded within the city (Figure 3).

The influence of the transformation of glacis fringe belts on the planning of green belts



Figure 1. The glacia fringe belt of Visby, Gotland, Sweden, surrounding the town's mainly medieval core. Principal sources: plan of c. 2002 provided by the Gotland Museum, author's field survey of July 2015, and archival research.



Figure 2. Part of the eastern section of Visby's glacis fringe belt. Photograph by Richard Whitehand, July 2015.

remains little studied. Thomas (1963, p. 14) refers briefly to attempts to limit construction around London as early as the sixteenth century, but it was not until the end of the nineteenth century that plans for 'green girdles' or 'country belts' around that city were under consideration, partly stimulated by Ebenezer Howard and his followers in the garden city movement and partly by recognition of the merits of similar belts elsewhere (Thomas, 1963, p. 14). It is evident, however, that planned urban green belts were already being considered elsewhere at much the same time that the city walls were being demolished in Kraków. In 1812 the town of New Thurso in Scotland with its surrounding parks and playgrounds was under construction adjacent to the existing town of Thurso (Williams, 1966). Better known, a figure of eight 'green girdle' parkland was a major feature of the new capital city of South Australia, Adelaide, founded in 1836 (Robinson and Liu, 2015). In this case significant parts of these 'Parklands', as they became known, were in due course converted to other uses, including sports grounds, botanical gardens, and public buildings, but the large

majority of the original green space has remained as such.

The reasons for the survival in the twenty-first century of glacis green spaces often now deeply embedded within cities, are various, but often related to attitudes towards heritage. They also vary greatly geographically. Often the extent to which the zone of green space survived has been interrelated with attitudes towards the maintenance or otherwise of the city wall. In the 1950s the remaining walls of the old city of Beijing were regarded as survivals of an outdated empire that were considered inappropriate in a socialist city, and demolition was proposed. A counter proposal that the moat surrounding the walls and the land at their base could make a 'green belt' did not convince the city government at that time (Fairbank, 1994).

In Visby a very different set of circumstances pertained, reflecting not least great cultural and political differences and the relatively small size of the town (Figure 1). Here the practically continuous survival of green space outside the wall was largely a reflection of the fact that none of the phases of the



Figure 3. Central Kraków, Poland, showing the green space occupying the glaciae that surrounded the medieval wall. Google image, dated 6/1/17.

town's growth until the twentieth century was sufficient to create pressure for more than very small amounts of urban development beyond the medieval wall. Even in 1889 the harbour area in the south-west corner was the only place where there was significant extramural building (Karta öfver Visby, 1889). Interest in conservation of the town for its historical significance was evident in the later nineteenth century in the restoration of the wall. In 1912 legislation was adopted recognizing Visby as having 'a town plan established by age' (World Heritage List, Visby No. 731, 1994, p. 1). This perspective underpinned the recommendation that Visby be added to the World Heritage List in 1995.

The explanation of green-space resilience deriving from a defensive function followed by subsequent limited extramural urban growth prior to the introduction of significant planning controls relating to historical assets is a recurrent theme (see, for example, Conzen *et al.*, 2012; Šćitaroci and Marić, 2019). The recognition of the value of fortifications as embodiments of heritage, and in many cases acknowledgement in recent decades of the environmental assets of associated green zones, would seem to have been occurring in sizeable parts of Europe and in many places in Asia.

Discontinuous green-space fringe belts

Despite both the visually evident association between fringe belts and city walls and the origins of the fringe-belt concept in Louis's research, which was particularly influenced by Berlin's city walls, the majority of fringe-belt research has been on less continuous fringe belts with different origins. Part of the explanation for this may well be that the development of fringe belts associated with other types of interruptions in urban growth, notably periods when other restraints on the growth of built-up areas, such as economic slumps, has on the whole occupied much greater areas of cities. Another factor may well be the emphasis given in most initial studies of fringe belts to those associated with

these other interruptions, combined with their having come into existence particularly in the last two centuries, when city walls have on the whole ceased to have major functional significance, albeit having received enhanced recognition as aspects of heritage.

A major factor in the formation of those fringe belts that have not been associated with fixation lines is the marked fluctuations over time in the creation of various types of land use. This is particularly so in the case of land use in which green space is a significant component. The tendency for the establishment of large green spaces, such as golf courses, rugby clubs, parks and public open spaces, to be inversely related to amounts of housebuilding has been documented for long periods in the UK (Whitehand, 1981). The outcome in the landscape of the creation at the urban fringe of such extensive, often irregularly-shaped green-space sites is almost inevitably different in certain respects from fringe belts heavily influenced by the lineaments of a glacial. Nevertheless, the two genetic types of fringe belts have much in common in terms of basic morphographic characteristics, such as large average plot size, few road crossings, and low building coverage. They contrast in such respects with the residential areas that comprise the greater parts of most cities (see, for example, Whitehand and Morton, 2003, pp. 828–30).

Fringe belts that are unrelated to lengthy fixation lines such as city fortification zones are, as morphological regions, in some respects less obvious in the landscape. Comprising sites of a great variety of shapes and sizes, they include sizeable numbers of individually large sites containing large amounts of green space. However, though studies of such fringe belts generally identify land uses that contain green spaces, the actual configuration of green space within individual fringe-belt sites has rarely been mapped for an entire fringe belt. An exception is the green space within the Edwardian Fringe Belt of Birmingham, UK (Figure 4) which originated at what was the edge of the built-up area of Birmingham at around the time of the First World War. Though green space predominates over

non-vegetated surfaces over the large majority of this fringe belt, there are small parts of its area to the north east and south east where other types of surface, mainly hard surfaces, predominate. There are also relatively small areas of land that have been termed ‘transitional’ in Figure 4: at the time of the survey on which Figure 4 is based these areas had been recently cleared. Though neither significantly vegetated nor built upon at the time, these were at least for a short time a resource for wildlife.

In a rare fringe-belt study of tree and herb species in 2000 and 2001, Hopkins (2012) examined 35 sites in Birmingham. Ten of these were in the Edwardian Fringe belt; six were closer to the city centre than this fringe belt; ten were farther out but not in other fringe belts; seven were in wildlife corridors as defined in the Nature Conservation Strategy for Birmingham (Birmingham City Council, 1997); and two were in other fringe belts. This study revealed that the Edwardian fringe-belt sites accounted for four of the five sites with the greatest number of species and nine of the ten Edwardian fringe-belt sites had an above average number of species. The same study also revealed the much greater average age of trees in the Edwardian Fringe Belt than in other parts of the city, suggesting that its habitats have been less subject to major disturbance.

Most of the research on fringe belts that are not associated with fixation lines has tended to be concerned with the industrial era, particularly periods since the mid-nineteenth century. However, systematic investigation of the degree of survival of fringe-belt green space has so far been very limited. Morton and Whitehand (1999, figs 4–9) mapped Birmingham’s Edwardian Fringe Belt over five time-spans between 1886–88 and 1995, and from these maps the changing amount of green space can be roughly estimated. On this basis the loss of green space between the middle of the twentieth century, by which time total embedment of the fringe-belt in the built-up area had occurred, and the end of that century was probably less than 10 per cent (see also Zhang, 2018, fig. 4.2). However,

measurements made by Zhang within a small part of that fringe belt for the same period reveal an average decline in green space closer to 20 per cent but with major variability between individual sites and between types of fringe-belt land use (Zhang, 2019, figs 3–4).

A type of fringe-belt green space that has become widely known in the UK as allotments, or ‘allotment gardens’, has been shown to be particularly susceptible to redevelopment. Axinte (2015, p. 18) has shown that a zone predominantly of allotments existing about 1–2 km from the centre of Birmingham, UK in 1830 had by 1880 been almost entirely redeveloped for housing. Thornes and Slater (2016), in light of their study of a number of smaller British towns in the eighteenth and nineteenth centuries, also concluded that such gardens have a relatively high vulnerability to redevelopment for housing. Thorpe (1975, p. 170) has shown the rises and falls in the number of allotment plots in England and Wales, 1908–72, with peaks in numbers associated with the World Wars. The intervening years of decline in numbers were associated with a housebuilding boom.

A factor that has been found to be pertinent to the resistance of fringe-belt green spaces to redevelopment for housing in some cases is the role of environmental lobbies. These have taken on particular significance in recent decades. Their increasing role in Birmingham has been shown by Whitehand and Morton (2006), again in relation to the Edwardian fringe belt. Here a notably influential factor has been the rise to prominence of ecological considerations in decision making, reflected in the designation of Sites of Importance for Nature Conservation, and arguments put forward by environmental lobbies (Whitehand and Morton, 2006, pp. 2062–3).

Fringe-belt green space and planning

Though the interest in green zones within and around cities has a long history, particularly within sizeable areas of Europe, research on fringe belts *sensu stricto*, especially in relation to a wider perspective on green space, has

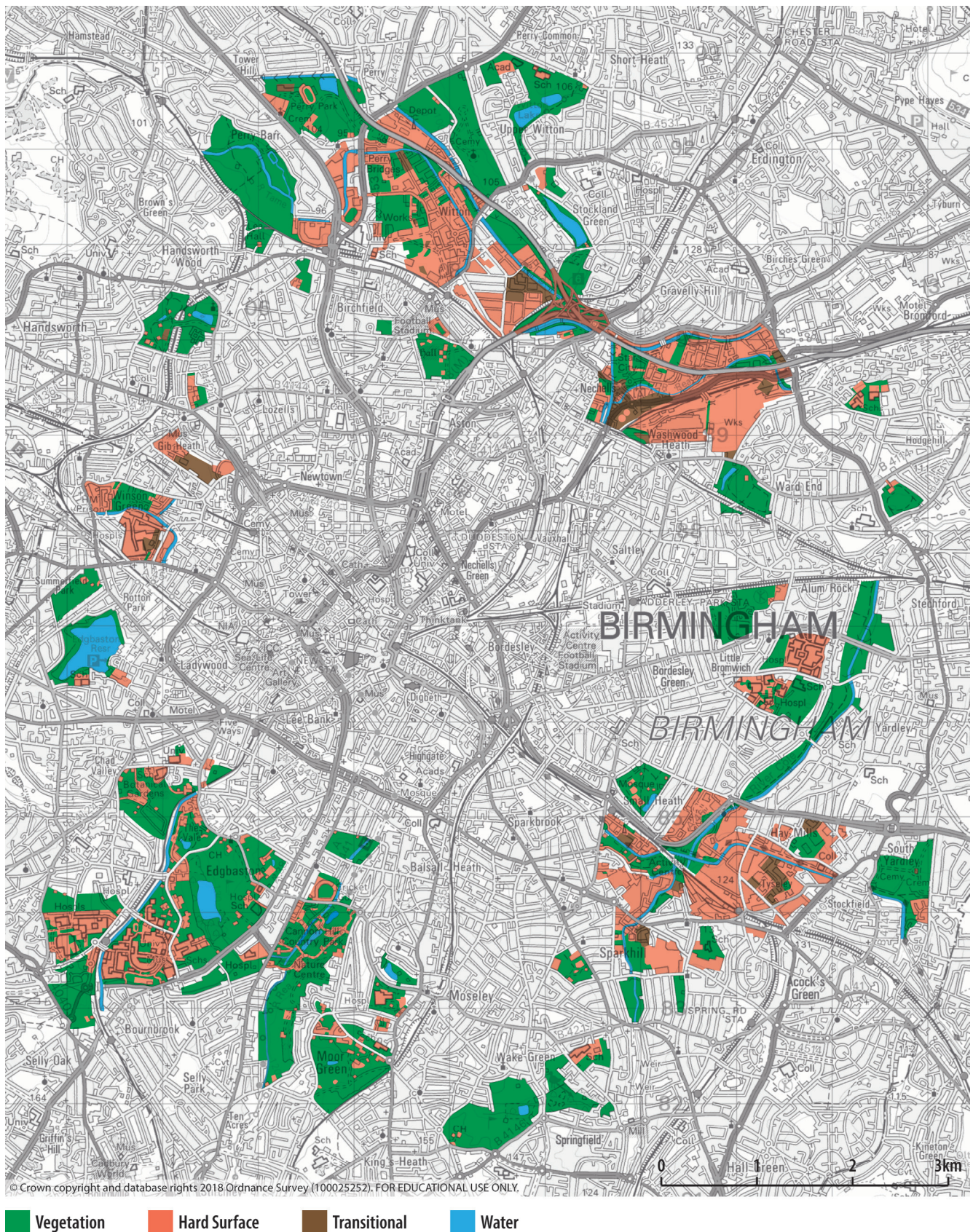


Figure 4. Types of surface in Birmingham's Edwardian Fringe Belt in 1995. Based on Cities Revealed: high-resolution aerial photographic database, surveyed 4 May 1995, GeoInformation Group, Cambridge; Cityview CD Rom, 1995 (see Morton and Whitehand, 1999).

been particularly slow to be pursued in terms of its pertinence to planning practice. This is despite noteworthy cases over the past 200 years of conversions of glacis into parklands and the designing of new towns surrounded by 'green belts'. It is true that early superficially similar conceptions to that of the fringe belt can be detected in planning. For example, according to the County of London Plan of 1944 (Ascot Town Plan Summaries, 1947, 2b) 'the park system aims at coordinated open space for the whole area, linking up with existing parks and with each other', and 'open spaces are designed so as to surround the entire community forming a natural cut-off from neighbours'. Readers seeing the distribution of the principal open spaces in the part of this plan that covers central London (Figure 5) and unaware of the low level of awareness in the UK of relevant research in the German-speaking world at that time might be forgiven for seeing in it a relationship to Louis's pioneering work on fringe belts in Berlin. And indeed, in retrospect, examination of records, especially cartographic records, confirms that a number of London's famous parks, such as Hyde Park and Regent's Park, are indeed part of a fringe belt, though not conceptualized as such by planners.

In light of the growth of interest in green space, not least in the form of greenways and green belts, including those related to city fortifications, and the accompanying significance of heritage conservation, the low level of interest in the relevance of fringe belts in urban planning is perhaps surprising. Part of the explanation may be attributed to the emphasis that has been placed on historical residential zones when delimiting intra-urban regions rather than the intervening mixed land-use spaces of fringe belts even when these mixed uses tend to share similarities, at least at a gross level, in their aspects of greenery. Perhaps a more important and not unrelated factor has been the slowness of dissemination of the fringe-belt concept until the last 2 decades or so, and this needs to be viewed in relation to the wider problem of the weak representation of research in urban morphology within planning practice.

It is to M. R. G. Conzen, who spent several of his early years in local planning before taking up a full-time post as an academic, that exploration of the scope for linking urban morphology to the applied field of 'townscape management' can be attributed (Conzen, 1966). In his approach, historico-geographical relationships are fundamental. For him, the way in which sites fitted together to reflect the historical character and development of an area was fundamental to enlightened urban landscape planning. Unfortunately, in urban green-space planning *practice* the focus of attention has largely been the intrinsic characteristics of individual sites rather than the way in which those sites combine historico-geographically. The ecological value of green space has indeed been recognized, but in other ways, notably in the form of wildlife corridors, parts of which may also form parts of fringe belts.

While the resilience of the planning proposal for maintenance of a belt of open spaces around central London in 1945 is noteworthy, the circumstances, and the strength of the argument on heritage grounds, are somewhat special, not least the fact that among the key green spaces are *royal* parks. There is a need for fringe-belt green space more generally to be viewed from a planning perspective. The scope for examination of the glacis fringe belts that are common within Europe is itself considerable. But arguably a higher priority is for studies of the historical geography of a wider range of fringe-belt green spaces, especially in relation to planning.

One of the few studies of fringe belts so far that might be expected to be informative about the interrelation of planning practice and the historico-geographical development of green space is that of the Edwardian Fringe Belt of Birmingham (Whitehand and Morton, 2004, 2006). However, prominent among the findings of this study is the extent to which the sites have been treated by decision makers as individual entities rather than in relation to one another.

The green spaces investigated in this case comprised eight playing fields and open sports grounds, eight areas of allotments, six institutions and their associated sports fields, five

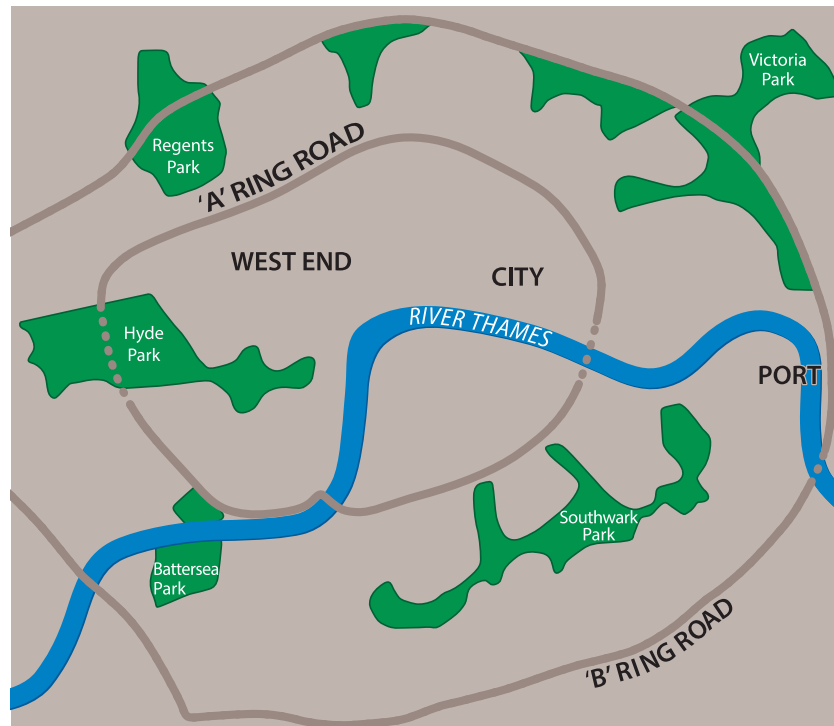


Figure 5. Sketch map of central London showing the principal open spaces, based on part of 'Development and zoning plan' in Ascot Town Plan Summary of the County of London Plan of 1944 (Ascot Town Plan Summaries, 1947, 2b).

parcs and three informal open spaces. Despite the high degree of survival of fringe-belt green space revealed by the previous mapping of it in this fringe belt in the period up to 1995, the associated planning process was now revealed to be far from straightforward. Although this was partly a reflection of the deliberate selection for study of well-documented sites, which tended to result in the overrepresentation of those for which planning activity was particularly evident, it was also indicative of the pressure on Birmingham's Edwardian fringe belt over the study period, 1948–2001. Over this period of just over half a century there was evidence that some form of at least very small-scale redevelopment was at some point being considered in all but four of the sites investigated. In many cases at least a small reduction in the amount of vegetation was envisaged. The attempted, or at least contemplated, changes were accompanied by a variety of proposed land uses and various interpretations of local planning documents.

Since the fringe-belt sites examined in this study were mostly sizeable, proposals for changes to them tended to be of concern to the occupiers of numerous other sites in the vicinity, including the residents of housing areas. In addition, the land use was frequently relevant to such bodies as the local Wildlife Trust and the National Playing Fields Association. Frequently several of the local authority's departments made comments on individual planning applications. The extent and diversity of representations was therefore large. The fact that the time lapse between the receipt of a planning application and its determination or withdrawal increased markedly over the study period was to a significant extent a reflection of the increasing amount of energy expended both for and against redevelopment. Some sites were subject to continuing negotiations between developers and the local authority at the end of the study period. In this light the amount of change, or potential change, in fringe-belt

green-space sites would seem on balance to be greater than recorded in studies of similar types of fringe belts in the UK in earlier periods (Barke, 1990; Whitehand, 1972). But more direct comparisons are needed. What does seem clear is that the far from transparent relationship between planning policy and planning decisions in the UK reflects especially the discretionary nature of the planning system in that country.

Conclusion

Work on fringe belts has progressed a good deal in recent decades, albeit that its relevance for planning practice has received little attention. Its application to understanding the geography and planning of urban green space is still at an early stage, although evidence of recognition of its significance in these regards is slowly broadening. And studies in France (Ducom, 2003, p. 104) and Russia (Kukina, 2006, p. 145) are indicative of this.

Among those with a professional responsibility for urban environments, the emphasis tends to be on individual sites and structures and small areas of special significance. There is a need for more integrated approaches. The fact that fringe belts have often retained much of their identity is a consequence of a great many influences. Unfortunately, far too few of these influences reflect consciousness of fringe-belt identities among those taking decisions about the urban environment. At a practical level fringe belts provide physical orientation within the urban area, but at a deeper level they offer a frame of reference within which the phases of development and physical manifestations of previous historical periods can be related to the environments of present urban areas. This points to the need for greater awareness of the historico-geographical structure of cities.

It is to be hoped that the reconnaissance of work on fringe-belt approaches to green space provided in this paper offers a starting point in building towards more general findings and more mature reflections on an important but under-recognized topic.

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