

Landscape Management for Urban Green Space

Multifunctionality:

A comparative study in Sheffield (UK) and Yuci (China)

by

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Abstract

The key purpose of this thesis is to investigate how the concept of multifunctionality, applied to the totality of green infrastructure, can help to underpin an improvement in the management of urban green space. The thesis uses a paired comparison study to investigate ways of enhancing landscape multifunctionality in green infrastructure through improved management in different cities. This study compares actual and potential prospects for development of green infrastructure in Sheffield, UK and Yuci, China.

Landscape management plays a key role in improving the quality of urban environments and enhancing green infrastructure. The concept of multifunctionality has been considered as a core property of green infrastructure and has been particularly impacted in Europe, UK and USA. However, most literature on green infrastructure emphasises its spatial planning phases, and usually gives less attention to landscape management aspects. Therefore, this thesis concentrates on management aspects of green infrastructure; particularly those that enhance its multifunctionality.

This research commences with a literature review to understand related research and management background. Subsequently, Geographic Information System (GIS) is used to show and explain what kind of green spaces and multifunctionality are present. Based on GIS mapping, relevant policies and plans are reviewed and evaluated in selected cities, supplemented by interviews with landscape managers. The interviews provide particular insights into implementing action and monitoring of management proposals and actions.

As a comparative study, this thesis has critically compared national and local policy contexts for green spaces in the UK and China. Based on mapping exercises and policy analysis, a representative set of management practices and specifications have been selected for more detailed analysis. The extent to which these documents contain multifunctional management approaches has been undertaken by evaluating them in relation to multifunctionality criteria.

It is clear that there are significant differences in practices between Sheffield and Yuci, although, many of their needs are similar. One output of the research is to contribute to 'knowledge exchange' as a way of improving policy and practice.

The comparative case studies in this thesis identify a number of potential factors in management for improving multifunctional green infrastructure. The roles of policy, management approach, and comprehension of multifunctionality among managers are discussed in order to ascertain the ways in which multifunctionality can be promoted in green infrastructure. Some of the benefits and barriers in the management process such as legislation and resources are discussed to investigate potential opportunities. On the other hand, the experiences of management from different backgrounds are explored as a basis for knowledge exchange.

Key Words: landscape management, green infrastructure, multifunctionality, knowledge exchange

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Chapter 1: Introduction

This research concerns landscape management in Sheffield (United Kingdom) and Yuci (China) as a way of exploring potential prospects for development of multifunctional green infrastructure in different regions and for knowledge exchange about multifunctional management based on practical experiences. Landscape management plays a key role in improving the quality of urban environment and enhancing multifunctionality in green infrastructure. It works to guide the efficient and effective management of green spaces for sustainability, health and wellbeing. However, most approaches to developing green infrastructure usually emphasize spatial planning aspects, and give less attention to landscape management aspects. The role of management connection, and its management to multifunctionality, is introduced and discussed in this chapter.

This chapter provides an outline of the research. It starts with a general theoretical background on the importance of landscape management. Then it presents the approach, aims of the thesis and objectives of the research, concluding with an outline.

1.1 Background to the research

This research concerns the management of green infrastructure in Sheffield (UK) and Yuci (China). Green infrastructure in the sense of a multifunctional landscape is becoming a common idea in landscape design, planning and management in many parts of the world such as UK, Europe, North America and China (Benedict and McMahon, 2002; Wright, 2011; Wu and Fu, 2009). It is recognised as an interconnected green space network with multifunctional components and includes natural and man-made features such as parks, forest reserves, hedgerows, wetlands, walkways and cycle ways (Science for Environment Policy, 2012). As a term of landscape, green infrastructure is recognised as an approach to connecting natural resources and health, enhancing quality of life and limiting urban sprawl and resolving environmental issues (Li, 2009).

Multifunctionality as the core idea in green infrastructure has also been particularly promoted within planning policy and practices. It is realised that landscape can deliver various functions within in the same or overlapping time or land unit for people, for wildlife and for the city as a whole (Ling et al., 2007; Tzoulas and James, 2004). Many researchers summarized multifunctionality as comprising five key landscape functions in urban areas: Ecological function, Economic function, Socio-cultural function, Historical function and Aesthetic function (Figure 1.1.1 demonstrates):

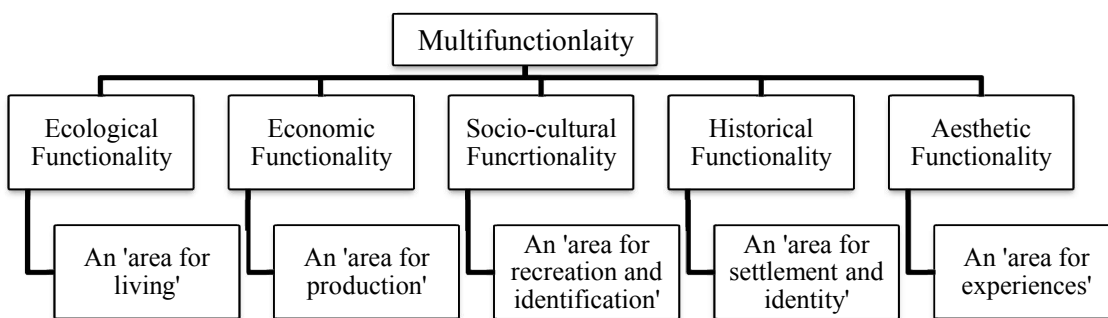


Figure 1.1.1: Five key landscape functions in multifunctionality

(Adapted from: Brandt et al., 2000; Ling et al., 2007; Selman and Knight, 2006)

Multifunctionality was originally developed as a concept to intensively manage agricultural and forestry landscapes in the countryside, and it expanded from rural to urban. It can be achieved through planning and managing the natural environment as integrated whole (Landscape Institute, 2009b). In this respect, landscape multifunctionality has been recognised in landscape planning, policy and management by some academic studies. The multifunctional green network can provide a place for influential national agencies and local authority planners and policy-makers to address similar problems in different ways or via different approaches (Barker, 1997).

Hence, academics and practitioners have been aware of the importance of multifunctional green infrastructure in practice. It provides a framework that can be used to guide future growth and development and is necessary to achieve various benefits through practice. This notion has extended into landscape planning, policy and management to achieve multiple

benefits from natural resources through landscape planning and management. It has been promoted as a practice in many developments in different regions (Benedict and McMahon, 2006; Natural England, 2009; The North West Green Infrastructure Think Tank, 2006; Thomas and Littlewood, 2010).

More specifically, the CLERE model as a multifunctional management model has been suggested for local authorities and managers to develop and recognise their functions, roles and opportunities (section 1.2). The CLERE model was developed out of Manchester University and has used reviewed academic literature. This model has not replaced other definitions of multifunctionality, but integrated multifunctionality as five aspects of Community, Landscape, Ecosystem, Recreation and Economy. Importantly, it provided approaches to develop strategies and to identify patterns of public use and the need to achieve multifunctional benefits in management (Barber, 2005).

However, most studies have emphasized spatial planning as the basis for achieving the development of green infrastructure, and less research has considered how systematic improvement of management could enhance the efficiency of green infrastructure in its multifunctional sense. Therefore, there is an opportunity to develop green infrastructure for multifunctionality and ecosystem services. Hence, planners and managers will face increasing demands for effective approaches to achieving quality of green infrastructure for multifunctional development.

In this context, this research serves as a comparative study to explore potential opportunities and prospects for improving the quality of management and enhancing multifunctional green infrastructure.

1.2 Theory and practice: landscape concepts within landscape management

- **Overview of green infrastructure and relevant studies**

The idea of green infrastructure is now recognised as a popular term in planning and management of landscape. It is not a new idea and has been developed from urban green spaces; it can provide sustainable development in urban areas with multifunctionality, now and into the future (CIWEM, 2010). Green infrastructure has been acknowledged as a network of multifunctional green and open spaces which include natural areas and features, public and private conservation lands, working lands with conservation values, and other protected open spaces (Benedict and McMahon, 2002, 2006; Natural England, 2007).

Urban green space as a basic notion of landscape plays a key role in green infrastructure to maintain sustainable development and quality of life. Urban green space is defined as all publicly owned and publicly accessible open space with a high degree of cover by vegetation such as parks, woodlands and other green spaces (Sandström, 2009). It is also seen as making an important contribution to the sustainable development of cities. Quality of urban green spaces plays a vital role for improving quality of life and benefits for urban environments. It is developed and managed by practitioners and is recognised as an essential factor in urban environments. Moreover, urban green spaces help to make cities more attractive to live in and provide opportunities for people to relax, exercise, play sports and meet friends (ODPM 2006).

In relation to urban development processes, various aspects of urban green spaces have been managed and researched. For instance, CABI, as an executive non-departmental public body, undertook a series of research studies for improving the quality of urban green space and to help practitioners and professionals create spaces and satisfy public demands.

Green infrastructure as a modern concept of the urban green space system relates to a

multifunctional green network and includes natural and man-made features which connect natural resources and health, and enhance quality of life within the urban environment and its surroundings (Benedict and McMahon, 2002; CIWEM, 2010). As a broad idea, green infrastructure is essential to both the sustainable environment and to long term social and economic development for cities (TCPA, 2008).

As an influential notion, green infrastructure has been recognised widely in regions of Europe, UK, USA and Asia. For instance, in England, the government published the National Planning Policy Framework (NPPF) in 2012 to replace most of the preceding planning guidance. In that document, green infrastructure is clearly defined as “*A network of multi-functional green space, urban and rural, which is capable of delivering a wide range of environmental and quality of life benefits for local communities.*” (DCLG, 2012b, P.52). In this condition, the political vision positively endorses the role of the planning process for the creation, protection, enhancement and management of green infrastructure (DCLG, 2012b).

In China, green infrastructure is recognised by researchers as being important in landscape development, providing multiple services and benefits. Some researchers gained experience from America, Australia, Europe and UK to define a concept of green infrastructure (Li, 2009; Wu and Fu, 2009). However, practitioners prefer to refer to the green space system rather than to green infrastructure in China. Especially in the planning stages, the green space system plan, as part of the statutory planning process is generally practiced in most cities in China.

Although there have been various understandings and definitions of green infrastructure, the notion is generally recognised for its importance for human wellbeing and sustainability. It is to bring various features into landscape development at different scales, from large scale to small sites. On the other hand, as identified by NPPF, green infrastructure is a network of green space, concerned with multifunctionality as a key to delivering a wide range of benefits for natural environments and human life.

As a core aspect of green infrastructure, the concept of multifunctionality has been considered

in landscape research and has had particular impact in Europe. The concept of landscape multifunctionality has organically developed from agricultural landscapes in the countryside and has been broadly considered from urban green spaces, the urban fringe and the countryside (Ferrari and Rambonilaza, 2008; Fry, 2001; Groenfeldt, 2006; Naveh, 2001). It has defined landscape multifunctionality as containing historical functions, ecological functions, communitarian functions, economic functions and aesthetic functions (Ling et al., 2007). In this condition, multifunctionality for green infrastructure has been considered within planning, design and management processes to ensure that spatially targeting achieves optimum gains for social, environmental and economic development.

The CLERE model has been offered as a management tool to improve multifunctionality in the process of landscape management (Barber, 2005). The CLERE model offers an important expression of multifunctionality and aims to improve this through management. It integrates multifunctionality in five broad functions, which are Community, Landscape, Ecology, Recreation and Economy (Table 1.2.1). This model offers a suitable construct to achieve improved management from the perspective of multifunctional approaches.

Table 1.2.1: The ‘CLERE’ Model (Adapted from: Barber, 2005)

The ‘CLERE’ model for multifunctional urban green space:

- As an agent for ‘Community’ development and education
- As ‘Landscape’ to be conserved
- As an ‘Ecosystem’ providing urban services
- As a ‘Recreational’ resource for health and well-being
- As a contributor to the local ‘Economy’

In general, green infrastructure as an integrated approach has extended the values of urban green spaces and has considered them as a network at different scales, which can be brought together for delivering multiple services and benefits, enhancing quality of natural environments and human wellbeing. In this process, multifunctionality has been recognised as the core notion of green infrastructure, providing a basis for a broad approach.

- **Role of landscape management in the development of green infrastructure**

The quality of green spaces does not rely solely on its initial planning and design, but also largely depends on how that initial quality is managed and maintained over time (CABE, 2004a). Landscape management, as way of achieving long-term vision, is closely related to planning and design to promote quality of green and open spaces. It has been practiced at scales from individual parks to large green spaces, from single sites to multiple broad areas. Unified management and daily maintenance together can deliver good quality and efficient services.

Traditionally, management is developed from park management and transferred into green spaces from site level to city level. As a fundamental part of management, maintenance is considered as ground maintenance of sites, for example, cutting and tending grass, including re-turfing and reseeding, and tending trees, shrubs, hedges, flowers and other plants (Welch, 1991). However, as a complex multi-faceted task, landscape management has a concern to ensure various benefits and achieve a long-term vision. Modern management might include more of a shift from physical to emotional properties, which are concerned with more than horticulture care. It could help managers to achieve their goals and ensure people get greater leisure enjoyment and benefit from green spaces.

Moreover, the CLERE model has been promoted to help managers and local authorities to identify skills shortages and define structures and management processes (Barber, 2007a). It considers all expert needs and concerted management for achieving optimum outcomes. The CLERE model helps to derive the key main tasks and performance measures which could support the vision of managing green space for multifunctional green infrastructure (Barber, 2005).

The importance of management is to realise the potential of green spaces through management practices. Moreover, the process of management should also identify potential. If the potential of green spaces is not realised in the management process, then management practices could

be sub-optimal and sometimes not develop the potential benefits overall (Levent and Nijkamp, 2004).

- **Selected cities: the context of Sheffield and Yuci**

The previous part outlined the general development of green infrastructure theories and their relationship with management. Although the management of green infrastructure has been considered within wide contexts, landscape management is studied as a contrast to promote its use in various cities. Sheffield and Yuci have been selected as a comparative study, to contrast their context of managing green and open spaces.

Landscape management for green infrastructure in Sheffield in UK

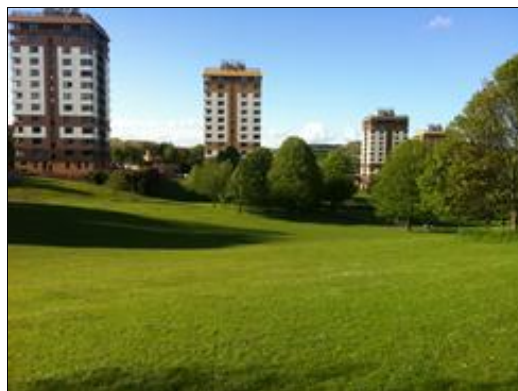
Sheffield, one of the greenest cities in Britain, has a rich variety of green and open spaces (Sheffield City Council, 2010a). It is one of England's largest cities and a metropolitan borough in South Yorkshire. Sheffield was an important industrial city in the north of England and now encompasses a wide economic base (Sheffield City Council, 2011a).

The city contains various landscapes typical of cities in the UK (Beer, 2003). For example, these pictures (picture 1, 2, 3, 4) give an impression of green spaces in Sheffield. This city also contains most of the Peak District National Park, which comprises much of the city's rural area and moorland, and is an important component of green spaces in Sheffield (as shown on Map 1.2.1).



Picture 1: Botanical Garden in Sheffield

Photo by Author



Picture 2: Ponderosa in Sheffield

Photo by Author



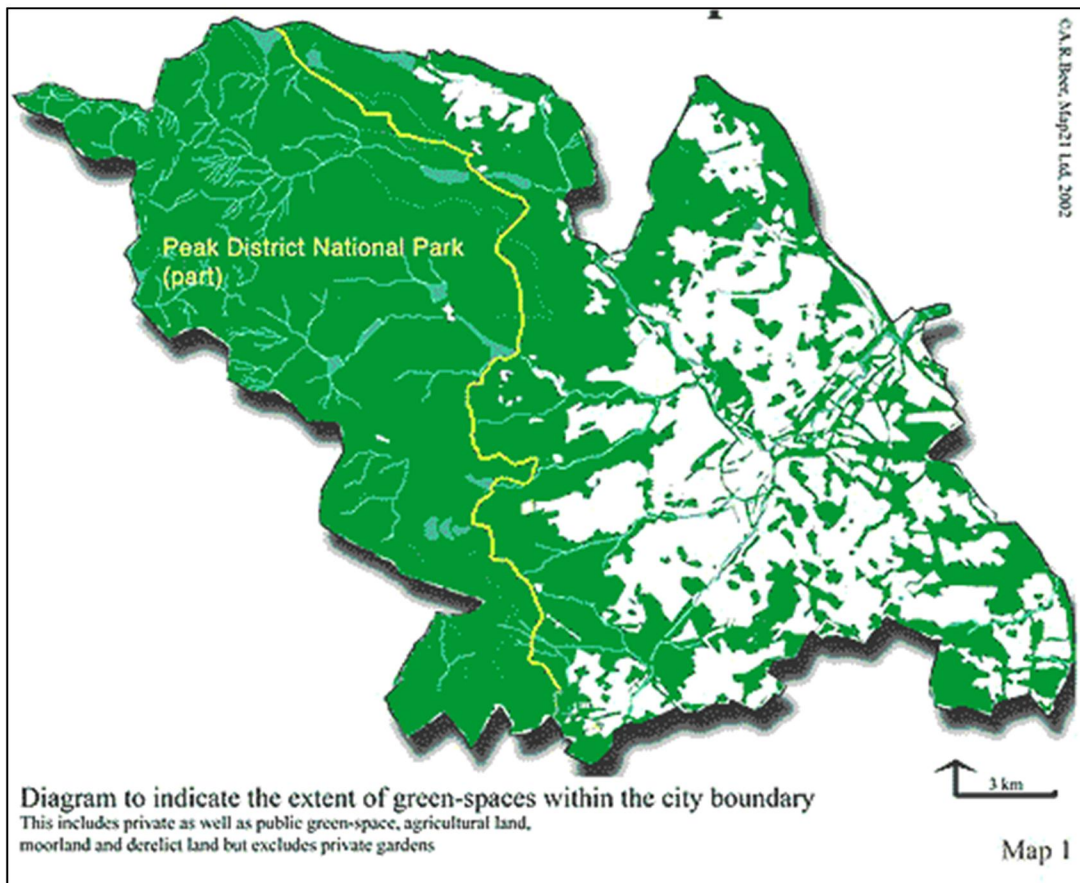
Picture 3: Peace Garden in Sheffield

Photo by Author



Picture 4: River Corridor in Sheffield

Photo by Author



Map1.2.1; Sheffield's green spaces (Sources from: Beer, 2003 [online])

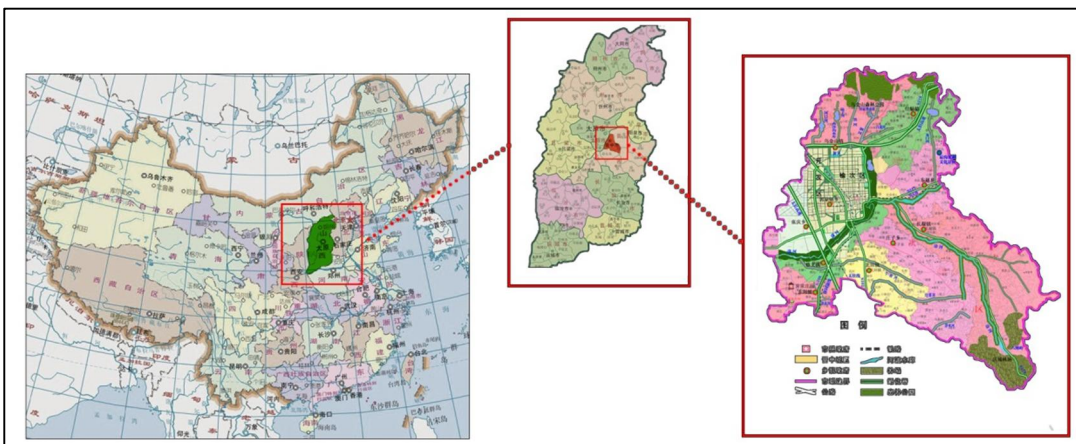
These green and open spaces have been strategically managed and maintained by local authorities over a long period. Since 1993, Sheffield City Council has been implementing a long-term Parks Regeneration Strategy for managing and developing its green and open spaces across the whole city. The strategy contains a list of public parks and open spaces for people in

the city. This strategy set out the proposed changes in managing parks and green spaces (CABE, 2005a). Through this process, green and open spaces in Sheffield are managed to deliver a wider range of services and have shifted from traditional to modern management.

In 2010, Sheffield City Council upgraded the existing strategy and promoted the Green and Open Spaces Strategy (GOSS) for improving quality of green and open spaces in the city. It strategically aims to ensure all areas of the city have quality green and open spaces for people to use and enjoy (Sheffield City Council, 2010a). Sheffield City Council proposes a site management plan on each main site, and the vision is to cover most of the parks and open spaces in future decades. Site management plans have been practiced as a way of promoting Green Flag Standards.

Through these experiences of management, the city of Sheffield is therefore concerned to identify issues and investigate opportunities and potential within management and to measure progress.

Landscape management for green infrastructure in Yuci in China



Map1.2.2: Location of Yuci in China (Source: Jinzhong City Government, 2009b)

Yuci is a medium size city located in central Shanxi province, northeast-central China (Map 1.2.2). It has a long history and was an industrial city. Since 1999, through the reform of the administrative division, Jinzhong city was established and covered many cities, including Yuci.

Yuci City, was renamed the Yuci District of Jinzhong city (China Wikipedia, 2012). The Jinzhong government is located in Yuci, which is considered to be Jinzhong's political, economic and cultural Centre.

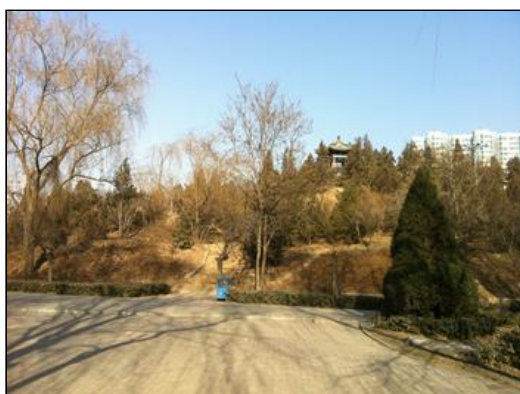
Yuci developed with a similar landscape history to Sheffield, namely as an industrial city and was undergoing a period of transition. In recent years, this city has tried to apply for National Garden City Awards in China and has implemented many actions to improve and increase its green and open spaces. Many new parks and open spaces were established in recent years (as Pictures 5, 6, 7 and 8 show). Yuci also contains a large rural area around its central area where there is extensive agricultural land and mountains (As map 1.2.3 shows).



Picture 5: Jinshang Park in Yuci
Photo by Author



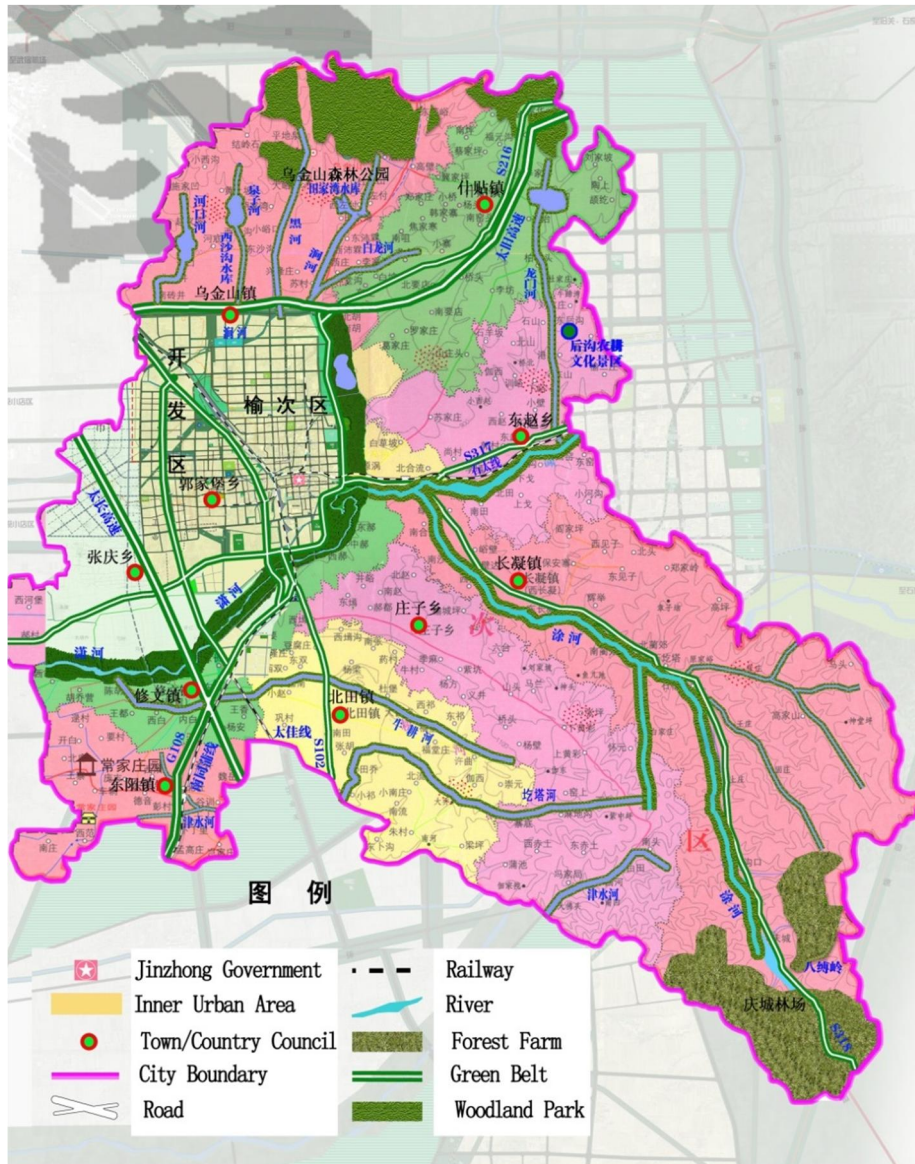
Picture 6: Sport Park in Yuci
Photo by Author



Picture 7: Yuhu Park in Yuci
Photo by Author



Picture 8: Public Square in Yuci
Photo by Author



Map1.2.3; Yuci’s planned green spaces
 (Source from: Jinzhong City Government, 2009b)

In Yuci, the development of green and open spaces is emphasized to achieve the National Garden City Award. In 2010, the Jinzhong Government promoted the Jinzhong Green Space System Plan, which specifies the development of green and open space in the Yuci District area. Through this plan, a series of proposals were promoted to establish new parks and open spaces in urban areas in the following decades. In response to this, local government input a large investment on green and open spaces. Hence, these experiences from Yuci could be considered to define potential and highlight issues in the management process for achieving higher quality of green infrastructure in the future.

1.3 Research aims and objectives

The aim of this research is not only to improve understanding and knowledge of landscape management through change in practice, but also to compare actual and potential prospects for enhancing landscape multifunctionality through management planning in Sheffield (UK) and Yuci (China) which could inform new ways of managing green infrastructure.

Research objectives and questions are set out in three categories: theory, practice and transferability. A definition of green infrastructure is established to distinguish from urban green spaces and this principally leads to the notion of multifunctionality being used as a basis for understanding the shifts occurring in the two cities. The research identifies the context of green infrastructure in Sheffield and Yuci, and existing management plans, and policies are investigated in terms of how they promote the multifunctional potential of different types of open space. It also proposes to investigate the barriers and bridges to achieving the kinds of measures required for improving landscape multifunctionality. Finally, as a comparative study, shared experience and knowledge are explored for improving management in both cities. Similarities and differences hope to determine ways of making management more effective.

This aim is addressed through five objectives:

1. Establish a definition of 'green infrastructure' (GI), in a way that distinguishes it from urban green space (UGS), based principally on the notion of landscape multifunctionality.
2. Identify existing green infrastructure in Sheffield and Yuci and use this to profile the quality and variety of specific types of open spaces.
3. Establish and critique existing green spaces management plans in relation to the degree to which they promote the multifunctional potential of different types of open spaces.
4. Consider the barriers and bridges to achieving the kinds of measures required for improving landscape multifunctionality.
5. Consider the potential for knowledge exchange between these two cities.

1.4 Thesis structure

This chapter has outlined a general background of multifunctional green infrastructure and listed a series of research objectives. In the following chapters, these issues will be discussed in greater depth.

Chapter 2 outlines the relevant concepts. This literature review will help to set up a theoretical framework for green infrastructure and management. The importance of Chapter 2 lies in investigating the underlying principles that help to establish theoretical multifunctionality and management. Chapter 3 explains the research methods, which include systematic literature, case study, GIS and interviews with ethics approval. It provides an explanation about why and how these methods are used in this study. Chapter 4 aims to provide an overview of the cases. It introduces the background of selected cities and prepared for following study. Chapter 5 tries to answer objectives 2 and 3. Through GIS mapping, this chapter will show the general green infrastructure condition in each city and evaluate this through assessment standards. It also tries to assess the landscape functions (extracting multiple functions based on typologies of GI and GS) and explain the management context with planning and policies. Additionally, this chapter gives a simple analysis of local landscape management. It aims to show the structures of management in these cities and how they work in relation to policies.

Chapters 6 and 7 will determine the barriers and bridges in the process of GI management to answer objective 4. This chapter seeks to find out the benefits of current management in green spaces. Therefore, this chapter analyses the impacts of management in three phases: political impacts (development of green spaces is impacted by policy changes such as GOSS in Sheffield and Green Space System Plan in Yuci); landscape multifunctionality in the management process, and how the functions of green spaces are managed and promoted by different approaches; and aspects of management could strengthen these functions and which aspects are lacking in current management. Chapter 7 also considers the scope for knowledge exchange between the cities and what they could learn from each other.

Chapter 2 Literature Review

2.1 Introduction

The previous chapter outlined a general process of landscape management for improving green infrastructure and discussed some of the related concepts and principles. This chapter reviews the literature of concepts that are closely connected to landscape management, both in practice and research. It also analyses the policy context in UK and China to understand the development of landscape management in planning and policy at the national level.

First, the three key relevant concepts which will be analysed in this chapter are urban green space, green infrastructure and multifunctionality. It has used a systemic review to collect and review these related literatures. The detail of the literature methodology will be described in chapter three.

Further, this chapter includes a discussion of relevant notions about landscape management to understand the way in which it impacts on green infrastructure. It is analysed with respect to both academic and practitioner literatures. On this basis, it seeks to explore a theoretical framework for improving the quality of landscape management.

2.2 Related concepts

Relevant key concepts have been identified as fundamental notions in the development of green infrastructure to enhance multifunctionality in urban green spaces. Urban green space as a central concept has been recognised and developed over a long period. The understanding of urban green space essentially influences implementation of its planning and management and also impacts on the quality and functionality of landscape for health and human wellbeing. On the other hand, green infrastructure as a complex network of green space has more recently been realised as important for human life and sustainability in the development of the urban

green space system. It is an extended notion of green spaces with different scales and benefits, which bring more ecosystem services for people. Similarly, multifunctionality as a key notion of green infrastructure has been claimed to provide more benefits and services through green infrastructure. Hence, this review analyses these concepts to clarify the scope for promoting green infrastructure management as a modern extension of urban green space management.

2.2.1 Urban green spaces

2.2.1.1 Concept of Urban Green Space

Urban green space exists in and surrounds urban areas. The idea of urban green space is taken to include all publicly owned and publicly accessible open space with a high degree of cover by vegetation, like parks, woodlands, nature areas and other green spaces in urban areas (Schipperijn et al., 2010). It plays a critical role in supporting urban ecological and social systems and providing important services in urban areas (Barbosa et al., 2007; Levent and Nijkamp, 2004).

In some academic views, urban green space is understood as an important contribution to sustainable development and contributes to quality of life (Levent and Nijkamp, 2004). Horwood (2011) points out that urban green space as a broad subject provides interests in diverse fields and links into policy issues such as healthy living, ecology, climate change mitigation, increased property values and community cohesion.

Furthermore, it also considered to be a resource for sustainable development, including recreational purposes and other aspects significant for human wellbeing (Bullock, 2008; Davies et al., 2008; Sandström, 2009). For instance, as recreational resources, urban green spaces might provide attractive backdrops to the urban development, safe and exciting play areas for children and reserves for urban wildlife (Bullock, 2008). Schipperijn et al (2010) cite various other research (Kaplan, 2001; Bjork et al, 2008; Mitchell and Popham, 2008) which

suggests that urban green space offers opportunities for promoting various aspects of health, including overcoming mental fatigue, increasing physical activity and improving longevity.

Kong et al (2010) define urban green space as an outdoor place with significant amounts of vegetation including those which exist mainly in semi-natural conditions. For example, publicly owned and publicly accessible open space with a high degree of vegetation cover, can be designed or planned with more natural characters (Schipperijn et al., 2010) and offers important functions which are essential for improving the quality of citizen life (Rafiee et al., 2009).

On the other hand, based on a range of interpretations by practitioners and users, urban green space is also understood as a land which includes many types of land in an urban setting from formally designed areas such as parks to more natural areas (House of Commons, 2006; ODPM & NAO, 2006). The Urban Green Spaces Taskforce (2002) in the UK has adopted a definition of urban open space which includes elements of the townscape such as boulevards, plazas, pedestrian areas, streets and squares. It covers the whole urban area and urban fringe and also includes various types of land such as parks, playing fields, golf courses, sports pitches, cemeteries, allotments, woodlands, institutional grounds, private gardens and corridors along river banks (Barber, 2005; ODPM & NAO, 2006; Schipperijn et al., 2010). DTLR (2002) gives a definition of urban green space that *“consists predominantly of unsealed, permeable, ‘soft’ surfaces such as soil, grass, shrubs and trees (the emphasis is on ‘predominant’ character because of course green spaces may include buildings and hard surfaced areas); it is the umbrella term for all such areas whether or not they are publicly accessible or publicly managed. It includes all areas of parks, play areas and other green spaces specifically intended for recreational use, as well as other green spaces with other origins”* (DTLR, 2002, P. 8).

Similar to academic views, some practitioners and managers confirm that good quality green space plays a vital role in enhancing the quality of urban life (CABE, 2005d, e; DTLR, 2002; ODPM & NAO, 2006; URGE-Team, 2004). It contributes to improving people’s physical and

mental health and breathing space to take time out from the stresses of modern life (Nicol and Blake, 2000). Therefore, quality of urban green space impacts on people, communities and quality of life and has a key role for people with aesthetic value, education and environmental amelioration, such as noise reduction, pollution infiltration, temperature regulation and windbreak.

Moreover, urban green spaces also help to define and support the identification of towns and cities which can enhance their attractiveness with many values as a boundary landscape separating neighbourhoods of distinct socio-economic characteristics (Levent and Nijkamp, 2004; Soleckiav and Welch, 1995).

CABE (2005d) in the UK also promotes urban green space as something which can offer lasting economic, social, cultural and environmental benefits. It helps to make neighbourhoods more attractive to live in and provides the opportunity for people to relax, exercise and play sport (House of Commons, 2006).

Urban green space has been recognised as a multifunctional green space system which is important for sustainable development, including recreational purposes and other features for human well-being (CABE, 2009a; Sandström, 2009). It plays a role in ensuring environmental, economic and social sustainability (CABE, 2003). The Greenkeys Project Team (2008) also noted that green space is a key resource for sustainable cities. The quality of urban green spaces is vital to people's health and the local economy (CABE, 2004b). Moreover, the Green Flag Scheme recognises the quality of individual urban green spaces and promotes a national standard to evaluate them (CABE, 2006b).

The importance of urban green space has been widely recognised by practitioners. Evidence of many practices and policies has been cited by the House of Commons and CABE Space (CABE, 2010b; HM Government, 2009; House of Commons, 2006; ODPM & NAO, 2006). For example, CABE (2004b) urges the government to promote the importance of high quality public spaces. They note that improved public spaces could be promoted by local and national

leaders. In some cities in the UK, local councils have produced green space strategies to enhance the quality of their urban green spaces. For example, Bristol Parks and Green Space Strategy sets out new green space provision standards to ensure all people have access to a range of good quality spaces and associated facilities (Bristol City Council, 2007). Bristol City Council (2008) recognises that urban green spaces provide breathing space and are crucial to the successful functioning of urban communities. Moreover, Cardiff City Council (2007) realises that *“Our parks and green spaces make a huge contribution to the character and quality of the modern city and the health and wellbeing of its citizens. They are one of the characteristics of Cardiff, helping to raise its national and international profile and encouraging inward investment and tourism”* (Cardiff City Council, 2007, P. 7). They (Cardiff City Council, 2007) have promoted a vision to improve parks and green spaces as a network of high quality which meets local needs and promotes sustainability, supports biodiversity and makes the best use of land and a significant contribution to the economic regeneration of the city. Similarly, Sheffield City Council (2010a) has proposed to ensure the city has green spaces of exceptional quality. *“The wider benefits of green and open spaces are nationally recognised”* (Sheffield City Council, 2010a, P. 4). Sheffield City Council also realises that urban green spaces play a key role in sustainable development which is beneficial to improving health, attracting economic investment and influencing environment quality, for example by moderating climate change.

2.2.1.2 Benefits of urban green space

As noted above, urban green spaces can deliver a variety of benefits to influence the quality of natural environment and people’s wellbeing. The roles and benefits of green spaces are extensive and multifunctional (COSTA et al., 2008), such as ecological benefit, architectural application and aesthetics, climatic and engineering functions (Rafiee et al., 2009). Davies et al (2008) also mentioned that the quality of urban green space has been shown to have important influences on the provision of ecosystem services such as reducing the urban heat island, clear air and water and climate regulation. Planning Policy Guidance 17 (PPG 17) also

stated that green spaces in urban areas for nature conservation and biodiversity, help to improve air quality (ODPM 2002), and help to support the ecosystem (Barber, 2005).

Furthermore, urban green space has been identified as a resource to provide health and wellbeing benefits between cities for people who live in the city and urban fringe such as smaller villages with more green and open space (Bezemer, 2007). For example, green spaces near homes promote physical activities and improve the health of residents and contribute to the quality of life (Lo and Jim, 2012). They also help to reduce stress and related illnesses (ODPM 2002).

Further, good quality green spaces in urban areas provide opportunities for voluntary and community activities. They provide the chance for people to participate in the process of design, management and care of their local space (ODPM 2002). Additionally, parks, green and open spaces are used at the larger scale by social groups within the surrounding neighbourhoods (Soleckiav and Welch, 1995). They are considered important in enhancing social cohesion and vigour (Lo and Jim, 2012).

Also, urban green spaces provide benefits for recreation and experiencing nature for people who live in cities (Rafiee et al., 2009). Urban green space, as an essential part of urban infrastructure, helps to improve the recreational and leisure needs for people and community. Besides, it also assists the economic revival of cities, increasing their attractiveness as a place for business investment, habitation, work and leisure (Barber, 2005). Economic benefits include opportunities for employment and revenue generation as well as indirectly impacting on property prices, attracting and retaining business, and playing a role in attracting tourists to encourage local economic actions (CABE, 2005e; Davies et al., 2008).

Moreover, the above benefits can be influenced by a range of policies. Therefore, managing green spaces can increase and improve the quality of green spaces and deliver benefits for human well-being and ecosystem services (Davies et al., 2008). Thus, studies emphasise an understanding of these benefits and seek to influence the management of green spaces.

2.2.1.3 Types of urban green spaces

Urban green space contains various types of land in an urban setting from formally designed to natural areas. These types of green spaces are considered at different scales from the smallest green squares to large expanses of open land (CABE, 2004a). The Department for Transport, Local Government and the Regions (DTLR) in UK suggested an urban green space typology which should be based on a classification of categories within set definitions of the different types of urban green spaces (DTLR, 2002). The Urban Green Space Taskforce (2002) provided a typology of urban green space with several types of land uses in urban areas (Table 2.2.1), which also extended to the rural-urban fringe. This typology was promoted by PPG 17 in England in 2002. Although PPG 17 has been replaced by the NPPF (National Planning Policy Framework) in 2012 (Department for Communities and Local Government (DCLG), 2012b), the typology is still considered in practices by managers. The classification is comprehensive, with nine primary green space types identified respectively and numerous sub-classifications. *“The classifications integrate public and privately managed space, range in scale from large rural and semi-rural tracts of land to domestic gardens, and include incidental greenery in otherwise hard urban spaces –such as along road and other transport corridors.”* (CABE, 2004a, P. 13)

In the same way, Scotland Government also promotes a typology to identify the types of green and open spaces in PAN 65 for Scotland green and open spaces (See table 2.2.2) (Scottish Government, 2008). The PAN 65 (Scottish Government, 2008) provides a similar typology of open spaces which includes eleven primary types. The difference between the two typologies is that the PAN 65 specifically includes the private garden in one primary green space type which also includes school grounds and institutional grounds (Scottish Government, 2008). However, PPG 17 puts the private garden into the “park and garden” section, and combines school grounds and institutional grounds into outdoor sports facilities. Another difference is that Scotland specifically puts other functional green spaces as one primary type, for example, including caravan parks.

Similarly, the Central Government in China has promoted a national standard for classification of green spaces (Table 2.2.3). This bears some similarity to the typology in PPG17. For example, it is also comprehensive with some primary types, which integrate public and private green spaces. However, a key difference is that three levels of green spaces have been defined in the classifications in China. It has more details to classify types of green space. Based on a different understanding, urban green space classification in China is much more focused on the urban area which provides much more detail on green space types at the third level of classification.

To sum up, although existing typologies of green spaces have slight differences, this study has identified some common names. In consequence, this study will utilise a typology which is mainly based on the typology from PPG 17 (Table 2.2.4 shows).

2.2.1.4 Summary

The concept of urban green space has been widely understood and promoted over a long time by both academic researchers and practitioners. The benefits of urban green space are recognised as being closely related to human life and natural environment. Local authorities and managers have sought to improve their understanding of green space management and its associated benefits. For example, CABI has produced a series of publications to improve the understanding of urban green space management. Moreover, various local authorities also promote green space strategies in their cities to maintain the quality of urban green space and its benefits.

Further, the role of urban green space is becoming increasingly important as a green network with complex features. The development of urban green space has been moved from park systems to modern landscape activities (like planning, design and management), now being understood as green infrastructure.

Additionally, typologies of urban green spaces as classified by practitioners and researchers have been considered. Classifications of urban green space have also been developed to guide local authorities. Based on these classifications, practitioners and researchers have taken targeted approaches to green space.

Land use code	Typology suitable for planning purposes and open space strategies	Land use code	More detailed classification for open space audits and academic research
1	Park and gardens	1.1	Urban parks
		1.2	Country parks
		1.3	Formal gardens (including designed landscape)
		1.4	Private gardens
2	Provision for children and teenagers	2.1	Play areas (including LAPs, LEAPs and NEAPs)
		2.2	Skateboard parks
		2.3	Outdoor basketball courts
3	Outdoor sports facilities (with natural or artificial surfaces)	3.1	Tennis courts
		3.2	Bowling greens
		3.3	Sports pitches (including artificial surfaces)
		3.4	Golf courses
		3.5	Athletics tracks
		3.6	School playing fields
		3.7	Other institutional playing fields
		3.8	Other outdoor sports areas
4	Amenity green space	4.1	Residential
		4.2	Business related
		4.3	Transport related
5	Allotments, community gardens and urban farms	5.1	Allotments
		5.2	Community gardens
		5.3	City (urban) farms
6	Cemeteries and churchyards	6.1	Churchyards
		6.2	Cemeteries
7	Natural and semi-natural urban green spaces, including woodland or urban forestry	7.1	Woodland (coniferous, deciduous, mixed) and scrub
		7.2	Grassland (e.g. downland, meadow)
		7.3	Heath or moor
		7.4	Wetlands (e.g. marsh, fen)
		7.5	Open and running water (like spring)
		7.6	Wastelands (including disturbed ground)
		7.7	Bare rock habitats (e.g. cliffs, quarries, pits)
8	Green corridors	8.1	River and canal banks
		8.2	Road and rail corridors
		8.3	Cycling routes within towns and cities
		8.4	Pedestrian paths within towns and cities
		8.5	Rights of way and permissive paths
9	Civic Spaces	9.1	civic and market squares,
		9.2	other hard surfaced areas designed for pedestrians

Land use code	Typology suitable for planning purposes and open space strategies	More detailed classification for open space audits and academic research
1	Public parks and gardens	Areas of land normally enclosed, designed, constructed, managed and maintained as a public park or garden. These may be owned or managed by community groups.
2	Private gardens or grounds	Areas of land normally enclosed and associated with a house or institution and reserved for private use.
3	Amenity green space	Landscaped areas providing visual amenity or separating different buildings or land uses for environmental, visual or safety reasons and used for a variety of informal or social activities such as sunbathing, picnics or kickabouts.
4	Play space for children. Areas providing safe and accessible opportunities for children and teenagers	Areas providing safe and accessible opportunities for children's play, usually linked to housing areas.
5	Sports areas	Large and generally flat areas of grassland or specially designed surfaces, used primarily for designated sports (including playing fields, golf courses, tennis courts and bowling greens) and which are generally bookable.
6	Green corridors	Routes including canals, river corridors and old railway lines, linking different areas within a town or city as part of a designated and managed network and used for walking, cycling or horse riding, or linking towns and cities to their surrounding countryside or country parks. These may link green spaces together.
7	Natural/semi-natural green spaces	Areas of undeveloped or previously developed land with residual natural habitats or which have been planted or colonised by vegetation and wildlife, including woodland and wetland areas.
8	Allotments and community growing spaces	Areas of land for growing fruit, vegetables and other plants, either in individual allotments or as a community spaces activity.
9	Civic space	Squares, streets and waterfront promenades, predominantly of hard landscaping that provide a focus for pedestrian activity and can make connections for people and for wildlife.
10	Burial grounds	Includes churchyards and cemeteries.
11	Other functional green spaces	May be one or more types as required by local circumstances or priorities

Table 2.2.3: Standard for classification of urban green space, China (城市绿地分类标准, CJJ/T85-2002, 中国)				
Code/Name 类别名称				
1 大类	2 中类	3 小类		
G1 Public park 公园绿地	G11 综合公园 Comprehensive park	G111	全市性公园 Urban park	
		G112	区域性公园 Regional park	
	G12 社区公园 Community park	G121	居住区公园 Residential	
		G122	小区游园 Petty street garden	
	G13 专类公园 Specialised park/ theme park		G131	儿童公园 Children park
			G132	动物园 Zoo
			G133	植物园 Botanical garden
			G134	历史名园 Historical garden and park
			G135	风景名胜公园 Famous scenic park
			G136	游乐园 Amusement park
	G137	其他专类公园 Other theme park		
	G14 带状公园 Linear park			
	G15 街旁绿地 Street greens			
G2 生产绿地 Productive plantation area				
G3 防护绿地 Green buffer				
G4 附属绿地 Attached green space	G41 居住绿地 Green space attached to housing estate			
	G42 公共设施绿地 Civic green space			
	G43 工业绿地 Industry green space			
	G44 仓储绿地 Warehouse			
	G45 对外交通绿地 Transport greens			
	G46 道路绿地 Green space attached to urban road and square			
	G47 市政设施绿地 Civic green space			
	G48 特殊绿地 Green space in special field			
G5 其他绿地 Other green space				

From: Ministry of Housing and Urban-Rural Development of the People's Republic of China (MOHURD) (2002), Standard for classification of urban green space (CJJ/T85-2002), China

Code	Typology	Code	More detailed classification for open space audits and academic research
1	Park and gardens	1.1	Urban parks
		1.2	Country parks (like Regional parks in China)
		1.3	Formal gardens (including designed landscape)
		1.4	Private gardens (in China, like small yards in village)
2	Provision for children and teenagers	2.1	Play areas (including LAPs, LEAPs and NEAPs)
		2.2	Skateboard parks
		2.3	Outdoor basketball goals
3	Outdoor sports facilities (with natural or artificial surfaces)	3.1	Tennis courts
		3.2	Bowling greens
		3.3	Sports pitches (including artificial surfaces)
		3.4	Golf courses
		3.5	Athletics tracks
		3.6	School playing fields
		3.7	Other institutional playing fields
		3.8	Other outdoor sports areas
4	Amenity green space	4.1	Residential
		4.2	Business related
		4.3	Transport related
5	Allotments, community gardens and urban farms	5.1	Allotments
		5.2	Community gardens
		5.3	City (urban) farms
6	Cemeteries and Religion	6.1	Religion
		6.2	Cemeteries
7	Natural and semi-natural urban green spaces, including woodland or urban forestry	7.1	Woodland (coniferous, deciduous, mixed) and scrub
		7.2	Grassland (e.g. downland, meadow)
		7.3	Heath or moor
		7.4	Wetlands (e.g. marsh, fen)
		7.5	Open and running water (like spring)
		7.6	Wastelands (including disturbed ground)
		7.7	Bare rock habitats (e.g. cliffs, quarries, pits)
		7.8	Agricultural land
8	Green corridors	8.1	River and canal banks
		8.2	Road and rail corridors
		8.3	Cycling routes within towns and cities
		8.4	Pedestrian paths within towns and cities
		8.5	Rights of way and permissive paths
9	Civic Spaces	9.1	civic and market squares,
		9.2	other hard surfaced areas designed for pedestrians

Based on: Urban Green Space Taskforce (2002): Green Space, Better Places (DTLR2002) , PPG 17, Pan 65, various cities' green space strategies. Compared with Standard for Classification of Urban Green Space in China with some modifications.

2.2.2 Green infrastructure: a developing concept

2.2.2.1 Green infrastructure: concept and definition

Green infrastructure is not a new idea and has appeared in landscape practices and academic studies for some time (Wright, 2011). The idea of green infrastructure has been realised in upgrading urban green space systems as multifunctional networks and includes natural features such as parks, forest reserves, hedgerows, wetlands and marine areas, as well as man-made features, such as walkways and cycle paths (Science for Environment Policy, 2012). As a term in landscape, green infrastructure is recognised as connecting natural resources and health, enhancing quality of life within the urban environment and its surroundings. It is a broad concept and provides many benefits for ecological, economic and social spheres and has been recognised as an approach to landscape planning in many parts of the world such as UK, Europe, North America and China (Benedict and McMahon, 2002; Wright, 2011; Wu and Fu, 2009). Researchers and practitioners generally understand that green infrastructure is the network of green spaces, rivers and lakes that connect towns, cities and countryside (Landscape Institute, 2009b; The Environment Partnership (TEP), 2007b). As the concept has developed, it has been promoted in practice in many developments (Benedict and McMahon, 2006; Natural England, 2009; The North West Green Infrastructure Think Tank, 2006; Thomas and Littlewood, 2010). The notion of green infrastructure also has extended into landscape planning, policy and management. It is an opportunity to achieve multiple benefits from natural resources through landscape planning and management. Thus, this section aims to explain the concept of green infrastructure and the relationship between green infrastructure and landscape management both from academic and practitioners' views.

(1) Definition of Green Infrastructure

Practitioners and researchers have studied the concept of green infrastructure in different ways. These definitions of green infrastructure are numerous and diverse within different contexts

from academics, policies and practices (Benedict and McMahon, 2006; Wright, 2011) (see Table 2.2.5, 2.2.6 and 2.2.7). Benedict & McMahon (2006) offer a definition of green infrastructure as an interconnected green space network including natural areas and features, public and private conservation land, working lands with conservation values, and other protected open spaces. It is planned and managed as a natural life support system for its natural resource values and for the associated benefits which confer to human populations. Wright (2011) has summarised, although green infrastructure can be defined by various explanations, it includes three core ideas which are connectivity, multifunctionality and “green” in common. Horwood (2011) also borrowed the definition of green infrastructure from Natural Economy North West Practice to define green infrastructure as *“the region’s life support system - the network of green and blue spaces which provides multiple social, economic and environmental benefits”*(P.964).

Also, the concept of green infrastructure has been stated in many practices and policy documents. For example, Natural England (2007) defined green infrastructure as the network of multifunctional open spaces, waterways, trees and woodlands, parklands and open countryside within and between our cities, towns and villages.

The North West Green Infrastructure Think-Tank (2006) states *‘green infrastructure is the region’s life support system – the network of natural environmental components and green and blue spaces that lies within and between the north west’s cities, towns and villages which provides multiple social, economic and environmental benefits’* (The North West Green Infrastructure Think Tank, 2006, P. 2).

The North West Green Infrastructure Think-Tank (2006) also points out that green infrastructure includes many physical components. They include hedges, outdoor sports facilities, coastal habitat, grassland and heath land, cemeteries, churchyards and burial grounds, agricultural land, allotments, community gardens and urban farms, moorland, village greens, open spaces, degraded land, private gardens, ponds, wildlife habitats, parks, lakes, fields, open countryside, woodlands, street trees and open spaces. These elements perform a vast range of

functions and deliver many benefits (Landscape Institute, 2009b) and need to be protected over the long term. Therefore, this requires long-range planning and management to achieve it (Davies et al., 2008).

Through these views, green infrastructure provides a framework that could be used to guide future growth, future land development and land conservation decisions and to accommodate population growth and protect and preserve community assets and natural resources (UE Associates Ltd, 2010). Furthermore, green infrastructure also helps to achieve multiple benefits, from environmental to social aspects, such as wildlife, climate change and economic benefits.

In consequence, government guidance in England suggests that *“Green infrastructure is a network of multi-functional green space, both new and existing, both rural and urban, which supports the natural and ecological processes and is integral to the health and quality of life of sustainable communities”* (PPS 12, P. 5). NPPF (DCLG, 2012b) provides a definition of green infrastructure that is *‘a network of multi-functional green space, urban and rural, which is capable of delivering a wide range of environmental and quality of life benefits for local communities.(P.52)’* This maintains the official endorsement found in previous definitions and confirms that the government will promote green infrastructure in the planning process in England. This recent and influential definition is used to guide this research as a general way of understanding green infrastructure. According to this definition, green infrastructure is used to emphasise the quality as well as quantity of urban and rural green spaces with their multifunctional role and their important benefits.

Academic groups	Definition of green infrastructure
Benedict and McMahon (2002)	Green infrastructure is our nation's natural life support system : an inter-connected network of waterways, wet-lands, woodlands, wildlife habitats and other natural areas; greenways, parks and other conservation lands; working farms, ranches and forests; and wilderness and other open spaces that support native species, maintain natural ecological processes, sustain air and water resources and contribute to the health and quality of life for America's communities and people.
Davies, MacFarlane, McGloin, Roe (2006)	Green infrastructure is the physical environment within and between our cities, towns and villages. It is a network of multi-functional open spaces , including formal parks, gardens, woodlands, green corridors, waterways, street trees and open countryside. It comprises all environmental resources, and thus a green infrastructure approach also contributes towards sustainable resource management.
Benedict & McMahon (2006)	Green infrastructure as an interconnected green space network includes natural areas and features, public and private conservation lands , working lands with conservation values, and other protected open spaces.
Kambites and Owen (2006)	Green infrastructure is a network of multifunctional green space provided across the defined area . It is set within, and contributes to, a high quality natural and built environment and is required to deliver liveability for existing and new communities
Weber, Sloan and Wolf (2006)	Green infrastructure" is a term that describes the abundance and distribution of natural features in the landscape like forests, wetlands, and streams.

Practice groups	Definition of green infrastructure
The National Planning Policy Framework (2012)	A network of multi-functional green space , urban and rural, which is capable of delivering a wide range of environmental and quality of life benefits for local communities.
Planning Policy Statement 12 (PPS 12)	Green infrastructure is a network of multi-functional green space , both new and existing, both rural and urban, which supports the natural and ecological processes and is integral to the health and quality of life of sustainable communities.
Landscape Institute (UK) (2009)	The networks of green spaces, rivers and lakes that intersperse and connect villages, towns and cities are at the heart of our green infrastructure (GI) . These elements perform a vast range of functions and deliver many benefits.
Green Infrastructure Guidance Natural England, (2007) Green Infrastructure: Mainstreaming the Concept Natural England, (2012)	Green Infrastructure is a strategically planned and delivered network comprising the broadest range of high quality green spaces and other environmental features . It should be designed and managed as a multifunctional resource capable of delivering those ecological services and quality of life benefit as required by the communities it serves and needed to underpin sustainability. Its design and management should also respect and enhance the character and distinctiveness of an area with regard to habitats and landscape types.

Practice groups	Definition of green infrastructure
TEP (2007)	Green Infrastructure is the network of green spaces and natural elements that intersperse and connect our cities, towns and villages . It is the open spaces, waterways, gardens, woodlands, green corridors, wildlife habitats, street trees, natural heritage and open countryside. Green Infrastructure provides multiple benefits for the economy, the environment and people.
Town and Country Planning Association, Biodiversity by Design: A Guide For Sustainable Communities	Green infrastructure should provide for multi-functional uses as well as delivering ecological services, such as flood protection and microclimate control . It should also operate at all spatial scales from urban centres through to open countryside.
The Town and Country Planning Association's Eco-towns Green Infrastructure Worksheet DCLG, 2008 TCPA, 2008	A network of multi-functional green space , both new and existing, both rural and urban, which supports the natural and ecological processes and is integral to the health and quality of life of sustainable communities.

(2) Development of green Infrastructure

The notion of green infrastructure is a relatively new term, but is not a fresh concept which has been developed over a period (ECOTEC, 2006; Horwood, 2011; NECF, 2006; The Environment Partnership (TEP), 2007b; Wright, 2011). Green infrastructure is widely represented in ideas, going back several decades. The idea of green infrastructure originally developed from green networks and ecosystems. It is a development on green space networks and includes more features. In some academic perspectives, green infrastructure is initially developed from the concept of Park Systems, Green Belts and Greenways (He and Liu, 2011). The original knowledge was based on the idea of Park System and Garden Cities concepts. The following part concentrates on understanding the development.

■ Garden Cities and Park system

The initial development of green infrastructure has been traced to the studies of Ebenezer Howard and Frederick Law Olmsted (He and Liu, 2011; Mell, 2008). Some researchers consider the notion of green infrastructure in UK can be thought to go back over 100 years to the notion of Garden Cities. Ebenezer Howard first introduced the notion of Garden Cities in his publication “Garden Cities of To-Morrow” in the 1880s. It was the first time reformers had considered promoting green space as a network to solve urban environmental and social problems. Through the idea of Garden Cities, prominence was first given to surrounding the urban area with a band of undeveloped space (Amati, 2008). Howard suggested that setting green spaces in close proximity to residential zones would improve both physical and psychological health for local people (Howard, 1902). It came to relate social and environmental issues together.

Similarly, in the late 19th Century, Olmsted promoted and planned park systems in New York and Boston Park System to reduce the environmental issues of industry. It aimed to provide space for recreation through systemic urban green spaces to and improve the urban environment with inner urban public space (He and Liu, 2011). As a pioneer of urban green

space management, Olmsted was one of the pioneer practitioners to hold community participation sessions during the scoping stage of his work and was one of the first planners to fully appreciate the role of local participation in planning.

The ideas of Howard and Olmsted were the first experience to linking the ecological capacity and social opportunities of an area through planning (Mell, 2008), although this notion has been broadly considered in landscape planning since then. Even now, their works are still being discussed by many green infrastructure researchers (Mell, 2008).

■ Green Belt

The concept of green infrastructure is also considered to have developed from the green belt. The green belt idea was thought of as an effective way of managing the protection and development of urban fringe areas (Thomas and Littlewood, 2010). Following Howard's Garden Cities concept, it was promoted as a way of creating and maintaining spaces to use the green belt to limit urban expanding (Liu Bin-yi and YU Chang, 2001). The idea of green belt therefore has impacted on landscape planning internationally, for example, Greenbelt Plan in London and Berlin.

The notion of the green belt maintains that the urban and rural area should be separated and not be allowed to grow, as a way of protecting natural areas. Green belts, therefore, have been used to define cities and towns, separate them from rural areas, villages and satellite townships, and prevent land owners from indiscriminately transforming all land to urban land uses (Amati, 2008).

Nowadays, green infrastructure is emerging as a better way to plan and manage these spaces than green belt. It is occupying much more policy discourse than the green belt (Thomas and Littlewood, 2010). Also, green infrastructure covers much more features and social impacts than green belt. Therefore, green belt is also considered as part of green infrastructure to provide more natural and social provision.

■ Greenway

The modern greenways movement also has influenced green infrastructure planning and implementation (Benedict and McMahon, 2002). Greenways are concentrated to protect linear corridors that improve environmental quality and provide for outdoor recreation (Linehan et al., 1995). The idea of a greenway combines road, railway, river corridor and civil infrastructure together to fill gaps of green space. It also contains the idea of a corridor as a way to connect the natural features to each other (Liu Bin-yi and YU Chang, 2001). The greenway has ecological, recreational and social-cultural functions with linear connection and high possibility specifications at different scales (Xu Wen-hui et al., 2004). It links ecological structure and function together to provide needs of open space for future and to promote for economic growth and development. It is also considered as a system to provide recreational opportunities, help control community development patterns, guide overall growth management efforts and provide health, safety and welfare benefits (Linehan et al., 1995).

From Chinese academic perspectives, Liu and Yu (2001) point out that greenways in the 19th Century occurred during the era of park-planning. The 20th Century has been dominated by urban space planning. The ideas of the greenway movement emerged during the last decade of the 20th Century.

In China, the multiple functions of greenway have suffered from a lack of research and recognition. For example, China specifically preferred huge grasslands and big tree transplanting without analysis of environmental conditions in traffic greenways in some cities. This goes against the idea of greenway, which promotes ecological corridor, connection and cultural inheritance and aesthetical landscape. (Xu Wen-hui et al., 2004)

■ Ecological network and Ecological infrastructure

Ecological infrastructure is defined as a structural landscape network which approaches a biological preservation framework and is strategically identified and planned to promote the

various natural, biological cultural and recreational process in the ecosystem (Yu et al., 2011). The concept of ecological infrastructure is recognised importantly to structure urban ecological structure and functions (Wu and Fu, 2009). In addition, aspects of ecological infrastructure preferred to natural landscape and sustainability of urban green spaces (Wu and Fu, 2009). The ecological infrastructure as a structural ecological network is critical in identifying the natural and cultural landscapes to support sustainable ecosystem services (WANG et al., 2008). Contrasted with ecological infrastructure, green infrastructure therefore contains much a wider notion with green space network and provides ways for multifunctional development.

(3) Understanding of Green Infrastructure

As a board notion, green infrastructure covers green spaces and many features in and around cities. As described before, there are many different understandings of green infrastructures. Some researchers believe that green infrastructure can be contrasted with grey infrastructure such as building infrastructure, roads, railways and hard flood or coastal defences (CABE, 2009a; Chang et al., 2012; Davies et al., 2006; IEEP, 2011). However, grey and green infrastructures are closely interactive and not mutually exclusive. As Davies et al (2006) explained, some elements of grey infrastructure might be considered as ‘grey’, but also provide the functions of green infrastructure which can be regarded as part of green infrastructure. For example, bus routes and walkways should be integrated as part of green infrastructure rather than solely grey infrastructure. On the other hand, green infrastructure can deliver huge values and multiple benefits which grey infrastructure may not be able to offer (Natural England, 2009). Therefore, in order to achieve sufficient priority, it is vital that green infrastructure takes equal place alongside grey infrastructure, in terms of understanding and practices in the planning process and political views (Kambites and Owen, 2006).

In other views, green infrastructure has been considered as a notion developed from the urban green system, especially in planning. For example, in China, green infrastructure is usually

referred to as the Green Space System which contains various environmental land patches and corridors covered by vegetation or water in urban areas (Chang et al., 2012). Sandstrom (2002) suggests that the concept of green infrastructure emphasizes the multiple purposes of green space in all-natural and semi-natural areas. It supports urban challenges to become sustainable regenerative solutions (CIWEM, 2010).

Jane Heaton Associates (2005) state that green infrastructure is a network of multifunctional green spaces which is planned, developed and managed to meet the environmental, social and economic needs of communities. It is set within and contributes to a high quality natural and built environment and aims to improve the quality of life and to develop sustainable communities (Jane Heaton Associates, 2005).

TEP (2005) believed that the emerging green infrastructure concept across many key agencies and sectors effects a significant improvement in the planning and delivery of integrated, multifunctional green spaces. Its approach to the planning, creation and management of the physical environment is also considered to be a sound basis to deliver social, economic and environmental benefit in an integrated and coherent manner. TEP (2007b) also points out that green infrastructure may be considered the essence of local character and sense of place, at the very heart of a community.

In same way, the North West Green Infrastructure Think-Tank (2006) reported that green infrastructure, as a multifunctional green space network, could deliver a variety of benefits in a range of situations. They recognise that green infrastructure applies at all scales and includes natural, semi-natural and designed spaces. They are concerned with improving the quality of the natural environment at different levels, for example, increasing the amount of green spaces provided during the physical process of urban development.

As a multifunctional green network, it includes natural and semi-natural lands in urban, rural and marine areas. It covers both natural and man-made elements such as rivers, woodlands, wetlands and green roofs (Science for Environment Policy, 2012). Good planning and

management of these elements can help to create place and support people's well-being, assist sustainability and protect biodiversity within urban and rural areas (Science for Environment Policy, 2012). Hence, green infrastructure can be created in many places that include different scales and cover natural and semi-natural areas.

Other researchers also think of green infrastructure as a life support system comprising a strategically planned and managed green network (ECOTEC, 2006; Horwood, 2011; TEP, 2007b). As a life support system, green infrastructure provides multiple functions and environmental services to a community. It includes employment, recreation, physical health and mental well-being, social interaction, contact with nature, drainage and flood management, climate, change adaptation and pollution control (TEP, 2007b). Similarly, the Natural Economy Northwest (2010) think green infrastructure in northwest UK is a life support system, based on the network of natural environmental components and green and blue spaces that lies within and between the region's cities, towns and villages.

Therefore, green infrastructure has been described as a contested term based on different understandings. Thinking about green infrastructure has moved from a narrow focus on ecology to embrace economics (Natural Economy North West, 2008). Actually, green infrastructure has been summarised as multifunctional green network with diverse emphasis to provide a range of benefits (Horwood, 2011; Landscape Institute, 2009b). Within these academic and policy documents, green infrastructure has multiple and diverse definitions. The concept is defined slightly differently each time (Mell, 2008). The fluidity results in changes and shifts in green infrastructure in response to the wider context. Thus, the concept is considered as a broad idea to help more sustainable conditions in the urban environment (Goode, 2006).

Briefly, as a broad concept, green infrastructure has been recognised in planning and management with some common notions. It is considered as a term that promotes landscape planning and management as a multifunctional agenda (Davies et al., 2006; ECOTEC, 2006; NECF, 2006). Green infrastructure covers most popular ideas in landscape studies such as

greenway, greenbelt and ecosystem services. In this idea, new and existing green spaces and green networks can be properly designed, conserved and integrated into planning and management. This agenda provides new opportunities to developing investment in cities and creating an approach between national and regional priorities for investment in economic renewal and environmental improvement (ECOTEC, 2006).

2.2.2.2 Principles of green infrastructure

Understanding the principles of green infrastructure is important to acknowledge in order to increase our ability to discriminate between the green infrastructure needs of different aims. Therefore, it is necessary to clearly establish a number of key principles for planning, design and managing green infrastructure (NECF, 2006; The Environment Partnership (TEP), 2005).

Principles of green infrastructure can be presented through a process combining consultation and expert knowledge (NECF, 2006). According to NECF (2006), such a process is based on academic rigour and experience from practice to provide a methodological approach to the exploration of green infrastructure potential. Numerous principles are promoted in relation to green infrastructure in many literatures. For example, Kambites and Owen (2006) conclude that green infrastructure principles in the US tend to have a primarily ecological focus, whereas UK ones tend to be more socially based. They (Kambites and Owen, 2006) also summarised the two approaches into a unitary set of consistent principles for green infrastructure planning, addressing both the ecological and the social functions (see Table 2.2.8).

Similarly, the North West Green Infrastructure Think-Tank (2006) promotes eight principles to guide green infrastructure planning, design and implementation (Table 2.2.9). CIWEM (2010) also upholds that a number of generic guiding principles underpinned and informed the development strategies which include connectivity, landscape character enhancement, landmark projects, biodiversity enhancement, multifunctionality and extended access.

CIWEM (2010) agree that these principles can be used to guide a strategic approach to green infrastructure growth and services.

Benedict & McMahon (2006) outline a series of principles to provide a strategic approach to achieve conservation and sustainable use of land for people, nature and economy. They note that the principles can be used as benchmarks to incorporate green infrastructure approaches into planning activities and land use and economic development. Natural England (2009) suggests that the clear principles help to achieve the successful delivery of green infrastructure through many projects.

Combining different principles from many literatures, a set of principles has been assembled to guide further study of green infrastructure. Table 2.2.10 shows these principles overlap in different research studies and practical examples. For example, green infrastructure should be focused on connectivity between natural lands and other open spaces which make links between people and nature (Benedict and McMahon, 2006). As a core principle of green infrastructure, multifunctionality has been applied to the green network as a whole. The multifunctional green infrastructure is underpinned by ecosystem services (or benefits) and can be enhanced by the connectivity of green infrastructure assets (Landscape Institute, 2009b).

These principles will provide a strategic framework to assess evidence on green infrastructure planning, design and management within the case study cities. Although the principles of green infrastructure might need to be adapted to particular environmental, social, political and economic conditions, they should be generally useful as a basis for investigating green infrastructure practice.

Table 2.2.8 Principles of green infrastructure planning (From: Kambites and Owen, 2006 P. 448)		
01	Comprehensive planning	GI should ideally be planned in advance of, or concurrently with, the built environment
02	Information collation	Extensive information collection relating to ecological, historical, social and visual matters should be undertaken to guide GI development.
03	Holistic approach	The development should be considered as a whole, on a number of different levels including: Geographically: each individual area of green space (or hub) should be linked via a network of 'corridors'. Politically: all relevant local authorities should work together to create a unified vision that can overlap administrative boundaries. Functionally: the resulting GI should be multifunctional, benefiting both people and wildlife.
04	Linkage	Links between natural areas and features, and between people and programmes, should be created.
05	Community involvement	Interest groups, stakeholders and others such as minority and disadvantaged groups should be involved, as this will ensure that development has a degree of ownership for those living within the surrounding area.
06	Recreational needs	The development should meet residents' needs for recreational opportunities and green routes/corridors
07	Preservation and conservation	Where possible the development should protect, restore and create habitats and ensure that all designated sites are conserved.
08	Respect for the site	By incorporating existing characteristics and features the development will exhibit a greater degree of diversity and identity.
09	Local distinctiveness	Local character and distinctiveness should be identified, enhanced and protected wherever possible.
10	Sustainable funding	Financial support for the development of GI should be sourced at an early stage and particular attention should be paid to longer-term issues such as maintenance and improvement.

Table 2.2.9: Principles of green infrastructure planning (From: The North West Green Infrastructure Think Tank, 2006)	
1	Identify and protect green infrastructure before development
2	Engage diverse people and organisations from a range of sectors
3	Linkage is key, connecting green infrastructure components with each other and with people
4	Design green infrastructure systems that function at different scales and across boundaries
5	Green Infrastructure activity must be grounded in good science and planning practice
6	Fund green infrastructure up-front as a primary public investment
7	Emphasise green infrastructure benefits are afforded to all; to nature and people
8	Green infrastructure should be the framework for conservation

Table 2.2.10: Correspondence of GI principles in key literatures									
	NECF (2006)	Landscape Institute (2009, 2011)	CIWEM (2010)	ECOTEC (2007)	Kambites & Owen (2006)	The North West Green Infrastructure Think-Tank (2006)	Natural England (2009, 2012)	Benedict & McMahon (2006, 2006)	TEP (2005)
Collective and connected linkage	✓	✓	✓	✓	✓	✓	✓	✓	✓
Context matter			✓		✓	✓		✓	✓
Social, economic and environmental benefits				✓	✓		✓		✓
Multifunctionality			✓	✓	✓		✓		✓
Involve communities					✓	✓	✓	✓	
Diverse professions,								✓	
Different scales and across boundaries						✓	✓	✓	✓
Public involvement					✓			✓	
Planning					✓	✓	✓	✓	✓
Established financial support				✓	✓	✓	✓	✓	
Framework for conservation					✓	✓	✓		✓
Extended access			✓						
Long-term commitment				✓				✓	

2.2.2.3 Planning and management approach

Green infrastructure is seen as important to promoting planning and policy in both the academic and practice literature. For example, Wright (2011) suggests that the idea of green infrastructure has experienced a rapid emergence in planning policy as a result of different interest groups. The Landscape Institute (UK) (2009b, 2011) also notes that green infrastructure can be planned, designed and managed as a network. It can come through regeneration and environmental projects or through community led initiatives. Through green infrastructure planning, existing open spaces of all types and sizes can be designed and managed to deliver more benefits (Landscape Institute, 2011). The planning of green

infrastructure also affords benefits from improving health and wellbeing, to managing the effects of climate change (South Yorkshire Forest Partnership, 2011b).

The North West Green Infrastructure Think-Tank (2006) has reported that the growth of green infrastructure is underpinned by policy and planning integration, landscape multifunctionality and organisational cooperation. It relies on an understanding that multifunctionality is central to the green infrastructure approach to planning and management (Landscape Institute, 2009b). The functions are multiplied and enhanced significantly when the natural environment is planned and managed as an integrated whole.

With saved understanding and planning, there are opportunities to achieve new green infrastructure through regeneration and environmental projects. Existing green spaces of all types and sizes can be integrated and managed to deliver more benefits for all people and communities (Landscape Institute, 2011). Therefore, planning and policy can be considered as pathways to deliver more benefits and to achieve multiple functions for environmental and human well-being functions from green infrastructure.

Thus, green infrastructure is now embedded in the planning system, with national statutory designations in the UK (CIWEM, 2010; DCLG, 2010; ECOTEC, 2006). The Planning Policy Statement Consultation (PPSC) (DCLG, 2010) stated that planning can make a significant contribution to mitigating and adapting to climate change, through the provision of well-planned green spaces within and between developments. In their view, green infrastructure should help to address changing climate through planning action. Natural England (2011) also argues that government should establish green infrastructure partnership to support the development of green infrastructure in England. The local partnerships might use green infrastructure to deliver various benefits, for example economic growth and regeneration and to improve public health, wellbeing and quality of life (Secretary of State for Environment Food and Rural Affairs, 2011). CIWEM (2010) also concurs that if green infrastructure is embedded into spatial planning and considered as part of the wider infrastructure of urban areas, it will be treated as an essential component of new development

and regeneration schemes.

NPPF (DCLG, 2012b) in England also affirms that local planning authorities should “*set out a strategic approach in their Local Plans, planning positively for the creation, protection, enhancement and management of networks of biodiversity and green infrastructure*” (DCLG, 2012b P. 26).

In terms of management, it is important to acquire a deep understanding of the linkages and relationship between different green space systems and people’s needs (South Yorkshire Forest Partnership, 2011a). It is important to inform good decision-making to ensure the efficient and effective approaches in the long-term management process.

As discussed above, green infrastructure is recognized as one of the most effective tools available to help people in managing the environment (Natural England, 2011). It offers a way of combining benefits together such as the economy, sustainable communities, and ecosystem services. It also uses strategies from other frameworks, like housing and regeneration strategies, to bring sectors together to develop aligned action-plans and to make the best use of limited resources (Natural Economy North West, 2010).

2.2.2.4 Green infrastructure typologies

According to literature from academic, policy and practice, the assessment of green infrastructure should be based upon a typology. Davies et al (2006) argue that different conditions and varying priorities may suggest different typologies. For example, Natural England proposed a green infrastructure typology (Table 2.2.11) that built on the typology in PPG 17. It is especially relevant to the urban environmental area and connects the urban area to its wider rural hinterland (Natural England, 2009). On the other hand, Benedict and McMahon (2006) and TEP (2007b) propose a functionally based typology which is used to determine the development of green infrastructure in a spatial context in England.

Parks and Gardens	Urban parks, Country and Regional Parks, formal gardens
Amenity Green space	Informal recreation spaces, housing green spaces, domestic gardens, village greens, urban commons, other incidental space, green roofs
Natural and semi-natural urban green spaces	Woodland and scrub, grassland (e.g. downland and meadow), heath or moor, wetlands, open and running water, wastelands and disturbed ground), bare rock habitats (e.g. cliffs and quarries)
Green corridors	Rivers and canals including their banks, road and rail corridors, cycling routes, pedestrian paths, and rights of way
Other	Allotments, community gardens, city farms, cemeteries and churchyards

The UK's Landscape Institute (2009b) also identifies types of green infrastructure assets to guide planning and management (Table 2.2.12). It includes the natural elements which can provide multiple benefits. These types of asset are considered to identify the characteristic elements of green infrastructure at different scales. Functions of green infrastructure may also vary according to scale (ECOTEC, 2007). How the management of green infrastructure systems is conducted will be scale dependent. Some benefits will occur regionally while others will be local. Scale considerations in green infrastructure will encompass assets of different sizes, from individual elements to wider ranges, such as a street tree (neighbourhood scale) to an entire moorland (county scale) or total environmental resources base (regional scale) (The North West Green Infrastructure Think Tank, 2006). The features in specific sites or broader environmental areas can be either rural or urban (Landscape Institute, 2009b).

Only once the planner or manager has a clear idea of what green infrastructure is made up of, can green infrastructure be debated and its different benefits and values determined. Therefore, a green infrastructure typology should be defined within the literature to assess its appropriate landscape management practices. Moreover, the development of green infrastructure with ecological, social and economic influences can be reviewed through assessments based on the defined typology of green infrastructure.

Based on this literature review, the proposed typology is selected, and similar typology from

Landscape Institute identifies a series of green infrastructure assets for connecting at scales (Table 2.2.11). The proposed typology of green infrastructure, therefore is used to maximize benefits and impact physical connections and enhance public engagements, improve opportunities for biodiversity migration (Natural England, 2009).

Table 2.2.12: Typical GI assets and their associated scales (LI 2009)		
- Local, neighbourhood and village scale - Town, city and district scale - City-region, regional and national scale	- Town, city and district scale	- City-region, regional and national scale
Street trees, verges and hedges	Business settings	Regional parks
Green roofs and walls	City/district parks	Rivers and floodplains
Pocket parks	Urban canals	Shoreline
Private gardens	Urban commons	Strategic and long distance trails
Urban plazas	Forest parks	Forests, woodlands and community
Town and village greens and commons	Country parks	Forests
Local rights of way	Continuous waterfront	Reservoirs
Pedestrian and cycle routes	Municipal plazas	Road and railway networks
Cemeteries, burial grounds and Churchyards	Lakes	Designated greenbelt and Strategic Gaps
	Major recreational spaces	Agricultural land
Street trees, verges and hedges	Rivers and floodplains	National Parks
Green roofs and walls	Brownfield land	National, regional or local landscape designations (e.g. AONBs, NSAs and AGLVs) Canals
Institutional open spaces	Community woodlands	Common lands
Ponds and streams	(Former) mineral extraction sites	Open countryside
Small woodlands	Agricultural land	
Play areas	Landfill	
Sports pitches		
Swales, ditches		
Allotments		
Vacant and derelict land		

2.2.2.5 Summary

Generally, green infrastructure as a term has been developed within various phases. The concept of green infrastructure has been researched and practiced by both academics and practitioners. This concept as a new term of green space between rural and urban, is not a new idea and has been developed over a long term, since the notion of Garden Cities and Park Systems over a hundred years ago. Recently, the notion of green infrastructure has considered covering various perspectives, for example green belt, greenways, ecological network and ecological infrastructure.

Importantly, green infrastructure is recognised as a multifunctional green network which has been proposed in policy agenda in some parts of regions in UK, Europea and USA. For example in England, the National Planning Policy Framework (NPPF) has provided a clear definition of green infrastructure. Furthermore, green infrastructure also prospected by planning, design and management. For example, table 2.2.5, 2.2.6 and 2.2.7 show a range of studies and practices for green infrastructure from academics, policy and practices which contains a number of academic papers, research proposals, plans and reports.

Additionally, as emerged term, green infrastructure is also considered in academics and practices in China. Although some views from academics have been recognised in the importance of green infrastructure, the development of green infrastructure still desired a promotion in practices in China. Some professionals and practitioners prefer green space systems to green infrastructure in China. This understanding has also been presented in planning process, for example, there has been promotion of green space system planning from the Chinese Central Government (Lin and Yang, 2010).

Moreover, in order to acknowledge the needs and abilities of development for green infrastructure, principles are studied to indicate developing and practicing green infrastructure. Thus, identified principles play roles to provide supports for planning and management of green infrastructure. Table 2.2.10 summarised general principles of green infrastructure for

planning and management. These principles provide a strategic framework for green infrastructure planning, design and management, for example, identify and protect green infrastructure before further development.

Typology of green infrastructure helps to determine green infrastructure components in a local context. A widely referenced typology of green infrastructure has therefore been considered in many research and practices (Davies et al., 2006; East Midlands Development Agency, 2008; Landscape Institute, 2009b). A consideration of typology (Table 2.2.11) therefore is proposed here to identify green infrastructure context in this study.

2.2.3 Landscape multifunctionality

2.2.3.1 Concept of multifunctionality

The concept of multifunctionality has been studied for a long time and analysed by many researchers. It is also recognised as an important part of green infrastructure (CIWEM, 2010; Gill, 2007; Goode, 2006; Landscape Institute, 2009a, b; NECF, 2006; TEP, 2007b; Wu and Fu, 2009). The idea of multifunctionality has been particularly influential in Europe, where it has strong resonance with the protective and creative measures being promoted through the European Landscape Convention (Selman, 2009).

What is landscape multifunctionality? Ling et al (2007) define multifunctionality as: *'an integration of different functions within the same or overlapping land unit, at the same or overlapping in time or 'real multifunctionality'* (P 286. Ling et al., 2007). Multifunctionality effects are impacted by human perception, cognition and values (Fry, 2001). It recognised that landscape (including urban civic and green spaces) can usually contain various functions for people, for wildlife and for the city as a whole (Tzoulas and James, 2004).

Therefore, the multifunctionality of green space also needs to be considered within the planning, design and management process to ensure that green space creation and management is spatially targeted to achieve optimum gains for social, environmental and economic development (SNIFFER, 2008). Barker (1997) emphasised the importance of strategies to the pursuit of multifunctionality as a management goal. He points out that *'any substantial green network in and around an urban area in the UK will have multiple uses, be in multiple ownership and involve a wide spectrum of interests (Barker, 1997, P.18).'* Landscape Institute in England (2009b) also states that multifunctionality is an important part of landscape planning and management, when promoted as an approach of green infrastructure. Thus multiple functions can planned and managed as an integrated whole, a managed network of green spaces, habitats and places to provide benefits. (Landscape Institute, 2009b)

The notion of landscape multifunctionality is not a fresh idea. It has been promoted on the urban fringe with a series of studies in the UK during the last few years (CIWEM, 2010; Countryside Agency and Groundwork Trust, 2005; Groot, 2006; Ling et al., 2007; Naveh, 2001; Selman, 2009). For example, the Countryside Agency (2005) (now Natural England) proposed a series of functions with values in a rural-urban fringe context associated with sustainability. They suggested ten key functions which could combine within multifunctional landscapes in countryside (Table 2.2.12). They also believe that designs based on these ten key functions can ensure that a range of benefits were derived from the same area of land, and this is an important means of achieving sustainable development locally and regionally.

1.	A bridge to the country
2.	A gateway to the town/urban area
3.	A health centre
4.	A classroom
5.	A recycling and renewable energy centre
6.	A productive landscape
7.	A cultural legacy
8.	A place for sustainable living
9.	An engine for regeneration
10.	A nature reserve
Source: Countryside Agency & Groundwork Trust, 2005	

However, when a landscape's character and function changes from rural to urban, the influences of multifunctionality need to be reconsidered, within the more urban phenomenon of green infrastructure (DCLG, 2012b; Landscape Institute, 2009b; Selman, 2009; The North West Green Infrastructure Think Tank, 2006). In this respect, multifunctionality has been recognised as pivotal to landscape planning, policy and management in some academic studies. The multifunctional green network provides a place for influential national agencies and local authority planners and policy-makers to address the same problem in different ways or through different approaches (Barker, 1997). For instance, Brandt et al (2000) argue that multifunctionality of landscape includes ecological, economic, socio-cultural, historical and

aesthetic functions. Similarly, Jongman (2000) refers to aesthetic functions, socio-psychological functions, educational functions, habitat functions, outdoor recreational functions and transport functions. Haines-Young and Potschin (2004) argue that multifunctional landscapes entail more than simply ‘layering’ of different spheres such as economics, ecology, culture, history and aesthetics. Ling et al (2007) also suggest historical, ecological, communitarian, economic and aesthetic functions.

Moreover, the notion of multifunctionality is also highly pertinent to the landscape management process. Green Future (Barber, 2005), proposed the CLERE model to explain multifunctional green spaces via five broad function types of green space and to help to achieve these functions in management, CLERE studies for community, landscape, ecosystem, recreation and economy. The CLERE model is a tool to help improve multifunctionality in the management process for managers. More details about this model will be explained further in section 2.2.3.3.

2.2.3.2 Development of landscape multifunctionality

Multifunctionality has gradually emerged over the past fifty years. The main concern was the increasing ‘monofunctionality’ of rural areas as places of food production, residence, transport corridors, and so forth. Until the 1990s, multifunctionality was achieved from the development of agri-environment schemes (Gallent et al., 2004). Over the past fifty years rural planning has seen a move away from the multi-use of space to relative monocultures in Britain. Sustainability became one impetus for a multipurpose approach in the environment. In this respect, the concept of multifunctionality is getting increasing attention both in the landscape sciences and in social studies (Brandt et al., 2000; Gallent et al., 2004).

However, much of the former literature on multifunctionality was focused on the intensively managed agricultural and forestry landscape in rural areas (Ferrari and Rambonilaza, 2008; Fry, 2001; Groenfeldt, 2006; Naveh, 2001). For instance, Fry (2001) suggested that

multifunctional landscapes required a research and management approach to agricultural landscapes and it has had only limited success in reducing countryside conflicts. Gallent et al (2004) also observe that multifunctionality was achieved from the development of agri-environment schemes. Amenity values have coexisted in the countryside with food services. Moreover, de Groot (2006) has noted that multifunctional landscapes can provide benefits of great ecological, socio-cultural and economic value which consist of a mix of goods and services, both private and public.

Nevertheless, agricultural multifunctionality is a narrowly defined term (Selman, 2009) with specific policy connotations within the European Union (EU). It is internationally discussed by the three major organisations, the Food and Agriculture Organisation (FAO), the Organisation for Economic Co-operation and Development (OECD) and the European Union (EU). As Groenfeldt (2006) summarised, multifunctional agriculture refers to the multiple services (functions), like environmental functions (e.g. wildlife habitat, food control functions), cultural and spiritual functions (cultural identity, religious observances), and aesthetic functions.

In this context, the multifunctionality in the agricultural sense refers to diversification away from monofunctional food/fibre production, to a mix of agriculture, forestry and other land uses (Selman, 2009). However, landscape multifunctionality has realised a much broader understanding recently. Wiggering et al (2005) point out that multifunctionality is considered to support sustainable land use and development respectively (Figure 2.2.1). The pursuit of multifunctionality is central to successful long-term intervention at the heart of landscape sustainability (Selman and Knight, 2006). Sustainability became one impetus for a multipurpose approach in the environment. Indeed, Brandt and Vejre (2003) state that *'the concept of multi-functionality is getting increasing attention not only in the landscape sciences but in society in general, since it seems to be an important aspect of ... sustainable development'* (Brandt and Vejre, 2003 P. 2).

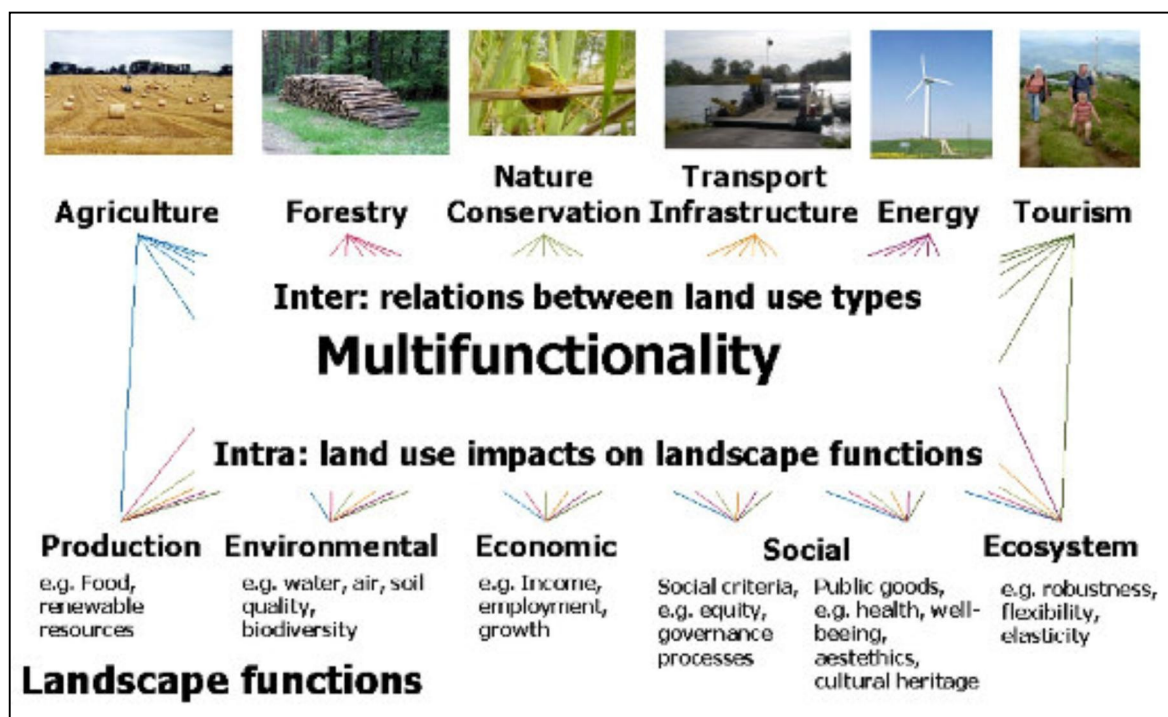


Figure 2.2.1: Multifunctionality of Land Uses (Source from: Wiggering et al., 2005 P. 7)

Moreover, landscape multifunctionality impacts upon a wide-ranging sphere. For instance, it has proved important in the eco-town concept, which has become a topical issue in the last few years in England. An eco-town with its surrounding green spaces should display multifunctionality, such as providing for play, recreation, wildlife, urban cooling and flood management (Department for Communities and Local Government, 2008). The idea of eco-town incorporates diverse functions to support sustainable development, like environment, community and nature conservation (Wildlife and Countryside Link, 2008). As the CPRE (2008) noted, much of the eco-town initiative appears to lie outside the planning system. The CPRE (2008) considered that *'green infrastructure can be defined as a planned and managed network of multifunctional green space, which can provide a healthy and rich environment'* (CPRE, 2008, P. 6). The idea of the eco-town has endorsed out by the government, as a way of addressing sustainability and environmental issues, and it is also closely related to landscape multifunctionality.

Multifunctionality has also been recognised as a core attribute of green infrastructure. For example, the CPRE (2008) states that *'green infrastructure can be defined as a planned and*

managed network of multifunctional green space, which can provide a healthy and rich environment? (CPRE, 2008 P. 6). In fact, it has been promoted in many practices and documents as a core principle of green infrastructure (Department for Communities and Local Government (DCLG), 2012b; Landscape Institute, 2009b; Selman, 2009; TEP, 2007b). For example, the new national planning policy framework in England (NPPF) has clearly stated that green infrastructure is a network of multifunctional green spaces, both in urban and rural areas, to deliver benefits for local communities.

In summary, the notion of multifunctionality from Brandt et al (2000) has been reinforced by many researchers such Barber, Ling et al and Gallent et al and used in broad studies (Barber, 2005; Gallent et al., 2004; Ling et al., 2007). However, as a core concept, it has been addressed mainly in planning and management by practitioners and researchers. As discussion shows above, the concept has much been emphasised in planning and policies, and has not particularly been applied in relation to management aspects. Therefore, the following part will try to explore how to promote multifunctionality in the management process.

2.2.3.3 The CLERE model

How can multifunctionality be promoted in green infrastructure through planning and management? The concept of multifunctionality has been realised by many researchers and practitioners in different studies. However, there are few methods to promote it in management process. Barber (2005) was a park manager and researcher, and developed the CLERE model to help managers to improve multifunctionality in the landscape management process.

This model first set out in the publication *Green Future*, which analysed studies in green space management in England and the US, and proposed the CLERE model for managing multifunctional management in urban green spaces by landscape managers (Barber, 2007a).

The CLERE model summarised multifunctionality as five components (Barber, 2005):

C: - As an agent for **community** development and education (social culture development)

L: - As **landscape** to be conserved (Landscape, historic)

E: - As an **ecosystem** providing urban services (ecology)

R: - As a **recreational** resource for health and well-being (social culture and aesthetic)

E: - As a contribution to the local **economy** (economy)

This model provides a detailed examination of the rationale behind each function, and management strategies to improve each function (The North West Green Infrastructure Think Tank, 2006). It redefines multifunctionality as a basis to manage parks and green spaces. This idea can be reflected to the management of a multifunctional urban green spaces network. Similarly, Barker (1997) emphasised the importance of strategies to the pursuit of multifunctionality as a management goal. In this regard, the purpose of the CLERE model helps us to understand how multifunctionality can underpin an improvement in the management of urban green spaces.

The CLERE model (Table 2.2.14) has five strands which are explained below:

- **Community**

Involving communities is recognised as a fundamental part in the process of planning, design and management (CABE, 2007b). The CLERE model recognises that urban green spaces is considered as an agent for community development and education (Barber, 2005). According to this idea, community involvement brings many social benefits to enhance the quality and multifunctional use of green spaces. This includes environmental, educational, and cultural benefits to the wider community.

The community aspect has been accepted and promoted by most academic researchers and practitioners (Barber, 2005; Brandt et al., 2000; CIWEM, 2010; Goode, 2006; Selman, 2004;

SNIFFER, 2008). For example, Ling et al (2007) state that communities living and working within the landscape are an integral part of functionality. They also mentioned that building connections between the landscape and the people is crucial to the sustainability of both the communities and the environment (Ling et al., 2007).

Moreover, parks and green spaces also help to strengthen the spirit of community, if they relate to an interest in the common welfare in local population. Thus people's use of the spaces can affect a community's image (Department for Transport Local Government and the Regions (DTLR), 2002). Therefore, community groups can become actively involved, with the right knowledge and resources, in the management of green spaces (CABE, 2010a). The CLERE model (Barber, 2005) includes how the community aspect is integrated with education and social and cultural development. It suggests a series of measures whereby managers can improve quality of management, such as providing community events, promoting volunteering, supporting families and generational mixing and encouraging wider partnerships.

- **Landscape**

Barker (1997) mentioned that the green spaces network has important values at both macro and micro scales. Based on natural elements, it provides a structural foundation with the grain of the landform to make people feel comfortable (Barker, 1997). In the CLERE model, landscape functionality is considered in cultural landscape sense, as supplied by green spaces. It is the "landscape to be the conserved", and it contributes to a sense of place that can help managed parks and green spaces to become actively used and visually pleasing. It is important to concentrate on cultural and historic features which are delivered by urban green spaces, and enhanced by appropriate management (Barber, 2005).

As the CLERE model (Barber, 2005) explained, landscape is not simply concentrated as one single function in green spaces. In fact, it should be recognised as one integrated aspect combining several landscape functions. Green spaces and parks supply cultural and aesthetic landscape services. The aspect is considered to include conserving landscapes for historical,

cultural and visual land value lies (Barber, 2005).

- **Ecology (Ecosystem)**

The ecological aspect from green space has been widely considered to be an important function. The CLERE model (Barber, 2005) indicates that urban green space provides urban ecosystem services, such as provision of living space, ecosystem operation, soil filtering, water supply and agricultural production. Some academic authors realise that urban green spaces and parks as an ecosystem provide various services and benefits to human society, which are of great ecological, socio-cultural and economic value lies (Groot, 2006).

In the CLERE model, Barber (2005) has pointed out that multifunctional landscapes deliver services such as delaying flood water, moderating urban temperatures and humidity, reducing air and water-borne pollution and supporting wildlife. CIWEM (2010) realises that green infrastructure as multifunctional landscape provides a network of spaces for recreation, habitat creation/preservation, climate change adaptation (flood protection and microclimate control), cultural and spiritual wellbeing. Hence, according to the ecological aspect, the design and management of landscapes should potentially improve both production and ecological functions and sustainability of the landscape (O'Farrell et al., 2010).

- **Recreation**

Urban green spaces and parks should be considered as a recreational resource for health and wellbeing which can bring benefits to public health (Barber, 2005). It is recognised as an area for recreation and identification with place (Brandt et al., 2000). Green spaces enable a wide range of recreational activity for residents and users. They provide a space to enjoy the tranquillity of the natural world within the urban environment. Staging events, promoting sport and encouraging healthy lifestyles are key issues for improving the recreational function via the management process. People who live closer to parks or recreation facilities are associated with increased physical activity and health (Forest Research, 2010). Therefore, recreation

usually relies on urban open spaces. The value of recreation is reflected by natural, historical and cultural features in green spaces (Brandt et al., 2000) and is impacted by the landscape management process.

Urban parks and green spaces are used for outdoor sports and activity. In particular, public parks and green spaces help to improve health and reduce inequalities and social exclusion in deprived areas. They can also provide for the recreational and leisure needs, increasing the attractiveness of a place for business investment, to live, work and take leisure (Barber, 2005). On the other hand, urban green spaces, located in urban areas with vegetation cover, are directly used for activity and recreation or indirectly used by virtue of their positive impact on the urban environment, enhancing health of citizens and quality of life in the cities or city regions (Barber, 2005).

- **Economy**

Urban green spaces and parks are considered as a contributor to the local economy (Barber, 2005). Economic function has been recognised in various landscape studies in both academic and practical research. For example, it was highly promoted as a key issue in multifunctional planning (CABE, 2005c; CIWEM, 2010; Fry, 2001; Selman, 2004, 2009; TEP, 2007a)

Good quality of green spaces might bring many economic benefits to the local economy, like enhanced property prices and the value of the taxable urban asset base. The economic aspect is related to other functional aspects. For example, *'recreational use contributes to raising productivity, saving on the cost of medical care, and promoting domestic and social harmony. (Barber, 2005)'* Moreover, increasing community involvement might help to promote tourism. It also can create a sense of place to encourage more investment and create more career opportunities. Furthermore, the CLERE model encourages that aspect of the economy that helps to improve staff skills such as horticulture, nature conservation and craft skills.

Function	Rationale	Typical Management issues
As an agent for Community development and education	Local parks and green spaces help to strengthen the spirit of community amongst resident populations who share an interest in their welfare. Community involvement brings social benefits and, through an engagement with local politics, helps to conserve the quality and multifunctional use of the green space system. Children, in particular, are able to learn about the natural environment, and develop skills through play	<ul style="list-style-type: none"> -Providing venues for community events. -Creating opportunities for volunteers. -Supporting families and inter-generational mixing. -Creating partnerships with business and voluntary groups. -Enabling alternate, sociable transport routes. -As a focus or catalyst for participatory planning exercises.
As Landscape to be conserved	Parks and green spaces are cultural landscapes and an integral part of the built form of urban settlements. Landscapes help to define a sense of place, local character and identity. Whole 'Cityscapes' are celebrated and action is taken to conserve their quality. More than 200 public parks are on the English Heritage Register of Historic Parks and Gardens as distinct landscapes. Fine landscapes such as the eight Royal Parks of London and Central Park, New York, feature as case studies in this report. Natural features within the city are often conserved as landscape in their own right.	<ul style="list-style-type: none"> -Conserving historic landscapes, woodlands and nature reserves -Conserving views from and into green landscapes -Maintaining structural elements such as trees, lakes and pathways. -Using park and green landscapes as settings for cultural activity such as outdoor theatrical and musical performances. -Using landscapes as an educational resource through school and volunteer programmes.
As an Ecosystem providing urban services	<p>Green spaces provide services to the urban environment through sustaining natural process.</p> <p>This includes delaying flood water, moderating urban temperatures and humidity, reducing air and water-borne pollution and supporting wildlife. Their proximity for recreation and community activity helps to reduce air pollution and energy consumption generated by motor traffic.</p>	<ul style="list-style-type: none"> -Supporting sustainable urban drainage systems. -Creating and managing wildlife habitats. -Promoting recycling, environmental education. -Improving connectivity between green spaces for walking and cycling. -Planting for shade and wind-protection.
As a Recreational resource for health and well-being	<p>Recreation is the use of leisure time to refresh and regenerate mind, body and spirit.</p> <p>Green space systems enable a wide range of recreational activity for urban dwellers, local and largely free to users. Parks and green spaces provide an escape to tranquillity and access to the healing powers of the natural world within the urban environment.</p>	<ul style="list-style-type: none"> -Staging events, promoting sport. Encouraging healthy lifestyles. Conserving tranquillity, providing facilities such as changing rooms, cafés & toilets. -Providing safe areas for children's play. Resolving conflicts between users
As a contributor to the local Economy	<p>Good quality green space enhances property prices, and the value of the taxable urban asset base. Recreational use contributes to raising productivity, saving on the cost of medical care, and promoting domestic and social harmony.</p> <p>Increasing community involvement and programming diversionary activity can reduce crime. Green space can help to promote tourism and create a favourable image of place to encourage inward investment and improve recruitment and retention of staff. It can help to nurture skills such as food production, horticulture and nature conservation craft skills.</p>	<ul style="list-style-type: none"> -Monitoring surrounding property values -Contributing to tourism -Promoting diversionary youth activity schemes -Running health and education programmes in partnership with local employers and schools -Promoting and marketing recreational opportunities -Creating opportunities for conservation and horticultural skills development

Table 2.2.14 The 'CLERE' model for multifunctional green space (Barber, 2005, P.21)

2.2.3.4 Why using the CLERE model

The entity of a managed multifunctional landscape, with improved understanding, can help managers achieve their management purposes (Barber, 2007a). Both academics and practitioners have recognised the significance of landscape multifunctionality in planning and management. However, in the process of managing multifunctional landscape, it is necessary to consider what needs to be managed. The CLERE model therefore tried to help identify landscape values and guide managers to achieve multifunctionality.

CLERE is adapted in this thesis as a framework within which to study improved management structures and practice within green spaces. Many researchers agree that multifunctionality mainly includes ecological, economic, socio-cultural, historical and aesthetic functions in landscape planning (Barber, 2005; Brandt et al., 2000; Ling et al., 2007; Selman, 2009). CLERE is a management model with the five distinct functions that are required in concerted management (Barber, 2007a). Some of the landscape issues are cross-functional. For example, Cultural and Educational benefits are indivisible and are difficult to separate. Community development and local economy also of interest.

The CLERE model offers to be particularly appropriate for management (Barber, 2005). It recognises these five key aspects as being the main purposes of conservation in urban green spaces, each aspect being linked to wellbeing, cultural and educational needs of people (Barber, 2005). Consistent with this model, the understanding of multifunctionality help managers plan the optimisation of the green space resource (Barber, 2005).

Moreover, Barber (2005) states that the CLERE model is not a replacement for any of the after native conceptions of landscape functions in green space. Rather, it is an approach to multifunctionality as a construct which is by our understanding or helps to realise improved management structures and practices. According to the model, managers can identify skills shortages in the management process and refine their management structure and processes

towards multifunctionality (Barber, 2007a).

2.2.3.5 Summary

In summary, multifunctionality has been recognised as a fundamental attribute of landscape. The concept of multifunctionality has been addressed in countryside and urban fringe by researchers and practitioners, especially regarding the agricultural landscape. Nowadays it has been understood as relating to benefits across a wide area which includes the urban area and suburban area. Multifunctionality has also been studied as a core part of green infrastructure from the countryside to the city within the planning and management process.

Hence, the pursuit of multifunctionality has been essentially promoted through green infrastructure in much research and practice, especially in planning and design. In order to achieve a multifunctional vision in managing urban green spaces, the CLERE model supports managers in making policy and practice improvements.

2.3 Landscape Management

This section considers the nature of landscape management and how it works in urban green space. Management of landscape is recognised as a way to improve and continue quality of landscape and to provide more benefits for sustainable, healthy human well-being. It is closely related to planning and design of urban green space and the promotion of high quality landscape. In England, landscape management has been practised over a long period from individual parks to large green spaces, from single sites to multiple broad areas forming a network. The interests in landscape cover many spheres, from natural environment to human social behaviour, with multiple benefits and functions. Therefore, landscape management is used to achieve and enhance quality of green spaces over a long period.

The following part explores what landscape management is and how it works in the process of

development. This part also will consider how the management process can work to improve green infrastructure.

2.3.1 Concept of Landscape Management

2.3.1.1 Understanding of landscape management

Landscape management refers to the efficient and effective management of green space, which includes urban and rural green spaces, by owners and managers (CABE, 2005b). As Welch (1995) described, traditional management of parks has always tried to ensure appropriate and high standards of maintenance and a diversity of activities, such as floral display, entertainment, music drama, dance, open days and education programmes. Moreover, modern management of green space might include more content that relates to physical and mental senses rather than just horticultural care. It could help managers to achieve their goals and ensure people get much more enjoyment and benefit from green space.

Importantly, management can impact on the quality of parks and urban green spaces. CABE (2004a) points out that the quality of parks and urban green spaces does not solely rely on their initial planning and design, but mainly depends, to a very large extent, on how the initial quality is managed and maintained. According to the management process, quality of parks and urban spaces can provide sustainable development for healthy life styles such as providing an enjoyable outdoor environment for users and an aesthetic amenity for residents, ensuring public safety for residents, commercial tenants and customers and protecting the health of residents, workers and customers (Huang et al., 2009).

Moreover, management of landscape is also considered to help to enhance biodiversity and sustainable development (Dzialak et al., 2011; Teillac-Deschamps et al., 2009). The management of landscape is a complex, multi-faceted task which is used to ensure an ecologically sustainable future (Lindenmayer and Cunningham, 2012) and to develop

sustainable communities. According to this notion, sustainable issues arise from difficulties associated with integrating humans and their activities into the structure, function, and ecology of the landscape (Dzialak et al., 2011). It requires finding solutions that integrate key ecological issues within the context of regionally important social and economic concerns (Dzialak et al., 2011). Thus, landscape management, provides a way to integrate and solve issues in the sustainable development of urban green space.

The management of landscape is also recognised as a way of enhancing multifunctionality in green infrastructure (Barber, 2005, 2007a; Landscape Institute, 2009b). It helps to achieve multiple benefits from landscape at different scales. Hence, multifunctional landscape is managed to enhance and achieve multiple functions and benefits in urban green spaces. For this purpose, Barber (2007a) has promoted the CLERE model as a management tool to help to identify skills shortages and define the structure and management process.

Good management can help to fortify successful parks and green spaces (CABE, 2010c). Maintenance as a basic element of management will help to improve physical conditions (Welch, 1991). Practitioners in Scotland (Scottish Government, 2008) realise that open space maintenance relates to a set of defined tasks which aim to preserve the condition of spaces. Normally, maintenance is mainly considered as ground maintenance which includes cutting and tending grass, including re-turfing and reseeded but not initial re-turfing or re-seeding and tending trees, shrubs, hedges, flowers and other plants and controlling (Welch, 1991). Management can combined ground maintenance and development together to work on green space issues (Rabbitts, 2010). Within green infrastructure, management styles are designed to be in keeping with nature, instead of imposing high-input maintenance. This not only helps to maintain condition, but also contributes to suggesting a longer-term perspective as place-keeping (CABE, 2011b; Dempsey and Burton, 2012), with flexibility to respond to a range of issues, like community needs, local economic development, biodiversity needs, quality, safety and competing uses (Scottish Government, 2008). In this condition, management of landscape is generally considered to depend on how people understand, evaluate and interpret landscapes (Ndubisi, 2002).

Additionally, CABE (2010b) suggests that unified management and day-to-day maintenance together could deliver good quality and efficient services. For example, uncoordinated management and maintenance tend to result from a lack of communication and familiarity with day-to-day operations. When the services are integrated, they are more likely to share priorities and better achieve their visions of service.

Moreover, CABE (2004c) also believes that maintenance and management could improve and avoid antisocial behaviour, vandalism, under usage and cleanliness. For instance, CABE (2004c) argues that good maintenance and management will make people feel safer in urban green spaces with wardens and better lighting. Also, it combines high quality design and planning and also considers to link to community well-being (CABE, 2004c).

In conclusion, landscape management refers to the important role of green space managers in improving, and not just conserving, urban biodiversity (Shi and Woolley, 2011). Managers therefore, have to be concerned to enhance biodiversity and improve the quality of urban environments and focus on changes of urban life, and leisure patterns (Greenhalgh and Worpole, 1996). In other words, management to enhance biodiversity is important, not just for protecting the green space, but also for providing good quality of life for people.

In some perspectives, management planning suffers from a lack of priority in local policy frameworks (Stockdale and Barker, 2009; Woolley, 2004); green space managers have to cope with decreasing resources and increasing pressures (Baggott, 2008). However, according to Baggott's view, management planning can build consensus, bring different managing teams together and set positive direction. Through this process, managers could bring issues together to develop visions for improving the quality of the green space and the visitor experience (Baggott, 2008).

Because of the importance of management in urban green spaces, the management has been promoted and mentioned in the green infrastructure in many documents and reports. Green

infrastructure refers to scales from the individual site to large scales and from single facilities to multi-attribute areas (Landscape Institute, 2009b; Selman, 2004; TEP, 2007a). The Landscape Institute (UK) (2009b) considers that green infrastructure is concerned with planning and management that connects landscape scales.

At different landscape scales, management could be emphasised in different ways. The management of landscape is not only managed as individual sites but also collectively, as one of the city's most important assets (Sheffield City Council, 2010a). It is applied at the wide scale of urban green spaces (Baggott, 2008). Large scale landscape management has paid attention to multiple benefits such as social and economic approaches to wellbeing (Selman, 2004). On the other hand, at the small site level, management is more focused on quality and activities from sites. For example, managers use the Green Flag criteria to measure the conditions of the site. Most landscape management examples are to be found at the much smaller spatial scale (Sheffield City Council, 2007b, 2009a, b).

Broadly, landscape management has been affected by landscape changes (like urban structure, and urban living). Therefore, managers have to consider the changes in life style, and concerns to protect wildlife and reduce pollution (Greenhalgh and Worpole, 1996). Managers also need to consider how to maintain the condition of space whilst at the same time protecting the spirit of place and promoting more possible benefits. This modern landscape management has to focus on more than traditional park maintenance.

2.3.1.2 Process of landscape management

As described above, landscape management is important in helping to keep a good condition of green spaces and bringing more benefits to people. However, it requires practitioners to invest time in process of management which is most useful or most effective.

Landscape managers should consider the ways in which effective management has come about

through innovative and responsive management (Haygarth, 2008). Management and maintenance are the most important way to achieve the manager's purpose over the long term. High efficiency of management planning includes policy making and implementation (Barber, 2007b). Ries et al (2002) suggest that the prerequisite of effective management is a legislative basis and good information about the state and the development of green areas. CABE (2004a) believes that the quality of parks and urban green spaces is often not a priority for local government, an issue compounded by lack of local political support and commitment to the provision of quality urban green spaces (CABE, 2004a). For example, although green infrastructure is already implied in the planning and policy agenda of many authorities (NECF, 2006; South Yorkshire Forest Partnership, 2011b; TEP, 2007a), it still requires stronger promotion in planning and policy. Huang et al also affirmed that managing landscapes should rely on effective public and institutional framework (Huang et al., 2009)

In fact, effective management, such as effective strategic guidance, vision and leadership, or having clear relationships each other, should relate to public policy frameworks (CABE, 2004a). In some academic views, the management planning process is portrayed as a cyclical one, utilising a monitoring and review processes to check process constantly against objectives (Baggott, 2008).

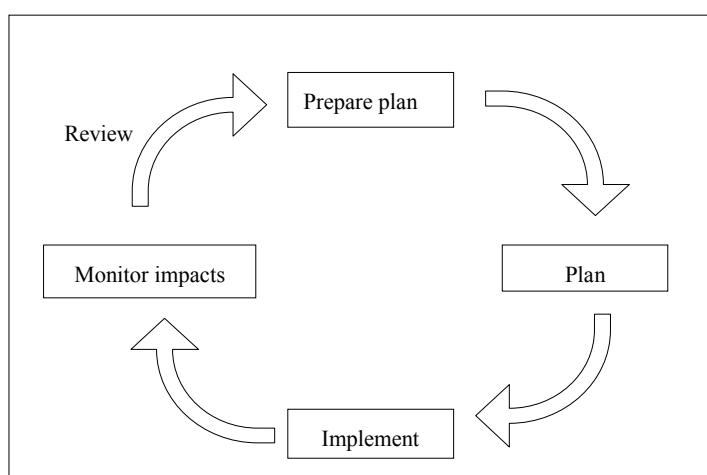


Figure 2.4.1: Process of landscape management planning (Based on CABE, 2005b; Thomas and Middleton, 2003)

The process of management planning needs to include certain key stages. Baggott (2008) promotes a process of management planning which is divided into four stages, namely planning a strategy for plans, producing the plan, implementing the plan and monitoring and review. Similarly, CABE (2005b) issued a guidance for producing a management plan. The guidance is based on the result of experience in practices and provides a mechanism for assessing what is important about the site (CABE, 2005b). It explains who is responsible for producing a management plan and how to produce it. CABE's guidance (2005b), refers extensively to the issue of efficient use of resources. However, assessing the quality of a park or green space is not simple in single management approach (CABE, 2006b). For instance, CABE (2006b) points out that a traditional park will probably require a high standard of horticulture and intensive maintenance where a wild nature reserve will need a completely different maintenance regime. In this case, the managers have to know clearly what they want to do, and this is a precondition of management (Welch, 1995).

Furthermore, managers should observe effective basic principles to help them improve their management effectiveness and decision-making. Welch (1995) mentioned that staff and managers should have guiding principles in their mind which they use when making decisions. However, there is no national standard for managing quality or national quality criteria for open spaces in England (CABE, 2010c). The Green Flag Award scheme is the national standard for parks and green spaces and its criteria reflect essential factors of a well-maintained space (CABE, 2007b). Nonetheless, it is a voluntary annual awards scheme. Yet, the issue is that if a space does not have an award, this does not imply that it is substandard (CABE, 2010c).

PPG 17 set out planning guidance to improve the quality of open spaces. Although this guidance did not mention the management process, it promoted potential opportunities to draw management planning into the policy framework. CABE (2005b) provides guidance to help managers deliver a management plan for parks and green spaces. When a management plan is produced, it could offer opportunities for landscape improvement and creation of green spaces.

Evaluation of landscape is important in the process of landscape management. Management

responses need to address potentially conflicting priorities (Stockdale and Barker, 2009) and to ascertain values of landscape which can be promoted and achieved. According to the evaluation process, managers could find many opportunities to develop an inclusive approach and use existing consultation, investment and sources to explore all issues (Baggott, 2008). Therefore, evaluation is useful in understanding the values of landscape and creating opportunities for further development and enhancing cultural life. Implementing these management plans can help to achieve aims in a structured and monitored way.

2.3.2 Delivery and success management

2.3.2.1 Quality of landscape management

Good quality of management and maintenance is not only combined with high quality design but is also linked to human wellbeing (CABE, 2004c). The quality of green space also closely links to people's feelings of safety, enjoyment and leisure. Poor parks and urban green spaces may lose their value and ability to deliver benefits and services for people (Barber, 2004). Therefore, managers have a responsibility to achieve quality of urban green spaces and to promote multiple benefits.

Some observers have argued that quality of green space is more important than quantity. Of course, quantity of green spaces also benefits the urban environment and wellbeing. However, quality of green space can bring more positive spin-offs in the surrounding area. It provides safe and leisurely spaces for people, and natural environment for wildlife (CABE, 2004c). Quality of landscape management, therefore, is used to achieve management purposes. In this case, green space standards are used as an approach to enhance the quality of green space in the planning and management process (Levent and Nijkamp, 2009).

In some views, planning and management of green space are indivisible. The planning of high quality spaces depends on management information as well as planning information. Thus,

landscape planning and management need more coordinated efforts in different authorities and communities and more dedicated resources to manage green space services (Levent and Nijkamp, 2009).

In this context, the management plan is a document which sets out management approaches and goals together with a framework to guide managers to achieve their vision for sites (Thomas and Middleton, 2003). As a management tool, planning helps managers to define and achieve goals now and in the future.

2.3.2.2 Landscape Management Plan

Landscape management plans are written to guide the efficient and effective management of green space, including both urban and rural areas. A management plan, with its content and style of presentation, must take into consideration who will be using it and how it assists continuity within the management planning process (CABE, 2005b). A good management plan is an essential tool. Managers will come to depend on it, no matter what scale of green spaces they are (Haygarth, 2008). CABE (2005b) also states that a management plan helps to gauge results and achievements.

Moreover, a management plan helps managers to understand and identify key features or values of managed green spaces and clearly establish management objectives and actions to be implemented (Thomas and Middleton, 2003). In this case, it should recognise the method of management planning and how to measure and monitor objectives (CABE, 2005b).

Management plans consider who is involved in the preparing process at the outset. It is a key opportunity to involve all stakeholders and communities in the process (Baggott, 2008). Writers of management plans should consider who the audience is for each section of the plan, and decide what level of detail to include because the potential audience is quite diverse (CABE, 2005b).

On the other hand, management plans may have different styles for specific urban green spaces. In the process of management planning, it is necessary to include an evaluation or assessment of the current situation to understand issues and potential solutions (Baggott, 2008).

Barker (1997) mentioned that managers operate in a political and fiscal system where they must compete for attention and for funds with other public services. Stockdale & Barker (2009) note that management responses need to address a multitude of potentially conflicting priorities whilst at the same time ensuring that sufficient social and institutional capital exists to allow for the promotion of landscape integrity. Thus, a good management plan, as an integral part of day-to-day management, could guide the strategic management process (CABE, 2005b). The flowing context aims to explore contents of the management plan.

(1) Structure of the management plan

A good management plan is an essential tool to guide managers in achieving their visions. However, there is no standard format for a management plan. Plans tend to contain certain standard elements (Table 2.3.1) and are produced with a logical process.

Introduction	This introduces the management plan and indicates management purposes and the importance of the document.
Description and information base	This summarises relevant descriptive information about management area. It should focus on the current situation and provides an illustration, map or sketch of the site.
Wider policy context	This shows the understanding of policy statements and strategies in different levels, which could impact on the delivery of services. This also helps the plan link to other relevant plans (e.g. local government plans, development plans) and legislation.
Evaluation of managed area	This identifies the values and key features from managed

	area.
Analysis of issues and problems	This determines any significance and particular aspect of managed area in currently and finds any opportunities affecting the area and a statement of the principal threats to its conservation, management and maintenance.
Vision and objectives	This is a long term vision which may include managed goals and specific vision statement. A set of objectives will be provided to be achieved within the time scale of the plan. A rationale for the objectives is often included and provides valuable justification of the decisions made during the planning process.
Work plan	This comprises specific actions which are planned and carried out to achieve the vision and objectives within time scale.
Monitoring and review	This outlines how to monitor implementation of the plan and gives a review to help carry it out. It sets up a process and timetable for monitoring and identifying which components of the plan will be updated and when.
Adapted from: Thomas and Middleton, 2003; CABE 2005,	

As table 2.4.1 shows, the management plan starts with an introduction to tell the reader the managers' purpose and importance of the plan (CABE, 2005b). It introduces a brief, introducing the goals for future management and how to achieve these goals through the plan. Normally, it includes some basic summary information such as name of area, location and size, group of managers and their responsibilities, primary resources and values.

In the process of planning, the management vision and objectives for the plan are needed to ensure compliance with legislation and to be promoted through the planning system. Therefore, the management plan usually includes an analysis of the policy, regional and national context (Thomas and Middleton, 2003).

Management plans use of various types, and serve specific roles at different scales (Haygarth, 2008). On large and complex sites, management plans tend to be large, technical documents bringing the management elements together in one place (Baggott, 2008). On small sites, the management plan is more structured and sets out specific key information, aims and objectives.

Therefore, the plan is promoted as a useful tool to help management achieve their management goals (Baggott, 2008; CABE, 2007b; Haygarth, 2008). Different types of urban green space will inevitably focus on different pressures and management regimes. Therefore, it is important to know what types and scales of green space exist in the area. So that managers can categorise them accordingly (CABE, 2004a).

Finally, the management plan is not static when it has been written. Rather, it is a dynamic, flexible tool to be used to deliver results and measure changes (Baggott, 2008). Therefore, regular review can keep the process of management planning active and provide opportunities to maintain dialogue and to continue to secure more resources and achieve management aims (CABE, 2005b).

2.3.2.3 Fundamentals of promoting management of urban green space

Management of landscape quality should put the subjects of urban green space management in place (CABE, 2004a). Thomas and Middleton (2003) point out that successful management planning is characterised by resources, skills and organisational systems. Additionally, budget and community involvement are key resources that impact on the process of planning, implementation and results. Therefore, legislation, skills, budgets, understanding and community involvement considered as five key features in process of landscape management planning.

(1) Political/Legislative/ Statutory Resource

As discussed earlier, political awareness and priorities importantly impact on the management of landscape. CABE asserts that the quality and long-term management of public spaces is stated to its importance being well established as a political priority (CABE, 2004c). Policies may impact on the delivery of park services in many areas (CABE, 2005b). Managers have to pay attention to operate in a political and fiscal system with public services. The status and

influence of parks and urban green spaces within local authorities are effected by the relative political priority of other public service areas (CABE, 2004a). Hence, an understanding of the current political situation and relationship between services can help green space managers work more effectively (CABE, 2010b).

Therefore, political awareness and priority should clearly define statutory powers and duties in the management process. Management plans could also be required to meet other legislative requirements. Hence, management plans might be considered as the status of legal documents to provide funding and power of management for managers (Thomas and Middleton, 2003).

Furthermore, related government documents and plans might be cross-referenced to support the management plan to achieve its purposes (Thomas and Middleton, 2003). If managers compose their aims and objectives in ways which directly and positively support the authority's broader aims or strategies, then they might improve their chances of achieving funding and policy priorities. For example, once managers show that their proposals could assist the aims and objectives of other departments or authorities, the local authorities may be more willing to be involved the management process or to help implement the proposals and to increase financial resources and technical support (CABE, 2005b).

(2) Skill/Training

“You can't manage a city park system, urban green infrastructure, or anything at all without knowing how to do it. All those parks, playing fields, playgrounds, nature reserves and woodlands need knowledge and skills to maintain.” (Barber, 2007c, P. 20)

People who manage urban green spaces should have sufficient knowledge and skills to maintain the condition of parks and urban green spaces (Barber, 2007c). CABE (CABE, 2009a) suggests that improved green infrastructure needs people with the right skills to manage the living landscape of our towns and cities. Barber (2007c) has mentioned that it is difficult to

manage a city park system, urban green infrastructure without knowing how to do it. Skilled staff are able to meet the challenge of providing and maintaining the quality of urban green space (CABE, 2004d). Managers have to improve and diversify skills in some areas, such as sports pitches, wildlife areas or woodland and traditional gardens (Sheffield City Council, 2010a). CABE (2004a) states that it is difficult to recruit and retain high calibre staff given the low status of parks and urban green space services within local authorities. Further, local governments might require more people with management and maintenance skills (Hope, 2007), which are in relatively scarce supply.

In addition, CABE (2004d) also argues for the need to increase the proportion of younger people with the right skills within the process of management and maintenance. Moreover, this is a need for professionals to plan, manage and maintain parks and urban green spaces. In this regard, local authorities have recognised the need to support and improve skills and competencies to provide quality management. For instance, Sheffield City Council promotes maximising existing skills from the whole range of management partners and developing a skill strategy for the quality of management in green and open spaces (Sheffield City Council, 2010a).

(3) Budget/Funding support

The budget considered to ensure that management of parks and urban green spaces has sufficient financial resources available to achieve management plan goals (Ries et al., 2002). Therefore, managers have to be concerned with ways of supporting the annual budget and identifying requirements for additional financial resources within management plans (CABE, 2005b). According to the management guidance, it is important to make assessment of the financial resources to identify available expenditure for park or green space management (CABE, 2005b).

Normally, public open and green space management is funded by local authorities through

annual budget allocations (Barber, 2007b; Sheffield City Council, 2010a). Managers who develop management plans and manage urban green spaces should know the authority's financial condition, which includes a breakdown of current revenue budgets and expenditure, any income generation and the current level of capital expenditure (CABE, 2005b, 2009a).

Secured funding and investment is important to ensure the successful attainment of long term management goods (DTLR, 2002). Therefore, managers have to find ways of raising money to make improvements, securing income to ensure effective and efficient management, and delivering services (CABE, 2006b).

Equally, green space also significantly affects the economic performance of a place. Good quality parks and public spaces have been recognised for their impact on the local economy, and for their role in attracting people to the area, adding values to housing and providing work opportunities (CABE, 2004c).

(4) Understanding

As previously discussed, the quality of urban green space largely depends on understanding and support from people. A better understanding of context will inform management decisions and methods (Barbosa et al., 2007; CABE, 2010b).

Here, understanding also includes a clear understanding of the managed area. It can ensure that values and important resources are factored into the management decisions. Besides, an understanding of the current context enables managers to respond quickly and in the relevant way (CABE, 2010b). For example, Green Space (2010) mentioned that managers and decision-makers may need to improve their understanding of users, such as how many there are, who they are, what they like and what they dislike about the sites and facilities provided.

(5) Community

Community development is a key factor of urban green space management (CABE, 2006c; Sheffield City Council, 2010a). As described earlier, community involvement brings many social benefits to enhance the quality and multifunctional use of green spaces, such as increased use, enhancement of quality and richness of experience.

Park managers may work directly with the local community. This may have positive benefits in the process of management and developing parks and urban green spaces (ODPM, , 2002). A shared sense of managed space in the development process could help to bring people of different backgrounds into greater community cohesion.

The main advantage of a high degree of community involvement also has potential for the creation of broad partnerships for urban green space, especially at the larger scale. It is not just to increase use and activities in a single site, but also to raise the overall level and quality of urban green spaces through communities and partnerships. Furthermore, a lack of community engagement in urban green space management might result in low demand and aspirations for urban green space quality from local people, local groups, communities and businesses (CABE, 2004a). Barber (2004) points out that community development deserves to be distinct from 'recreation', reaching into the heart of a local authority's purpose, because communities are diverse groups with ethnic, social and cultural differences.

In summary, for management of urban green space to succeed, the community needs to be closely involved. Hence, managers should aim to work with communities and partnerships. Partnership and communities therefore could strengthen and support management groups to achieve their aims. They could also link together and learn from each other and have a stronger relationship (Barber, 2004). Therefore, a management plan should recognise and try to draw together the diversity and range of community needs (CABE, 2005b).

2.3.3 Summary

Briefly, landscape management is used for the efficient and effective management of green space for long-term vision, including urban and rural areas. Landscape management is then understood implying to provide ways for local authorities, stakeholders and managers identifying potential in long-term management. Moreover, the management of landscape is also recognised to enhance multifunctionality in green infrastructure.

Traditional management of landscape was addressed to ensure high standards of maintenance and a diversity of things to do. The current management of urban green spaces has included wide notions from physical to mental sense and much more than horticultural care. Through quality of management, managers are able to achieve their goals and ensure the delivery of multiple benefits from green spaces over a long time.

In order to achieve quality of management, management planning has been considered as an approach to set out management aspects and goals together with a framework for achieving managers' vision on sites. The management plan, therefore, is written to guide the efficient and effective management for quality of urban green spaces, including urban and rural areas. Further, the CLERE model as a multifunctional management tool has been promoted in practices, and helps to identify skills shortages and define the structure and management process. Adopting management is not only keeping with maintaining condition, but is also important to suggest keeping with nature, social and economic perspectives as a long-term notion on urban green spaces. Hence, the fundamentals of promoting management of urban green space have been studied to understand key features in the process of landscape management planning.

In conclusion, landscape management refers to the important role of authorities and managers in improving the quality of urban green spaces, and help to achieve multifunctionality through long-term management. Managers, therefore, have to consider promoting management plan, and focusing on improvement of management approaches for achieving management goals.

2.4 Policy context (Development of policy at national level)

2.4.1 Introduction

The related concepts of urban green spaces and management of landscape have been highlighted in earlier sections as fundamental themes that should be promoted over a long term. Although the management of landscape has been recognised in the policy system by some researchers, these are still needed to develop an understanding of landscape management in policy and political spheres. Therefore, the aim of this part attempts to analyse and reflect on landscape policy in both UK (especially England) and China. This will focus on the emergence and implementation of policies in urban green space in the past two decades. This analysis is based on official reports, policy documents and research articles.

The first part analyses the policy context in the UK, which mainly concentrates on the green space policy context in England. The selected documents are generally national policies and documents which have been considered and used by many cities. Some documents may have been superseded but is still necessary to review them to understand how policy developed in the past, such as Planning Policy Guidance (PPG) and Planning Policy Statements (PPS).

The second part comprises an analysis of the policy context in China. There are more documents at the national level which have been produced over decades and are still used. Also, there are some standards and documents produced to promote national gardens which have also been analysed in this section.

2.4.2 The UK policy context (focus on England)

In the English context, there have been a number of official reports on urban green space. These official reports and policy documents (as Figure 2.4.2 shows) specifically reflect the English context. The review of policy context in the UK has been structured into two groups: government policies and some national reports which are non-legislative. Although some government planning policies were superseded and replaced by the National Planning Policy Framework (NPPF) in March 2012, they are still valuable in understanding changing policy context in England.

This section is divided into two parts. First, it analyses how landscape (urban green space) became a political concern (how landscape matters emerged in policy perspectives) in England in the late 1990s. Secondly, based on these main policies, documents and reports, it analyses some policy initiatives in terms of their implication.

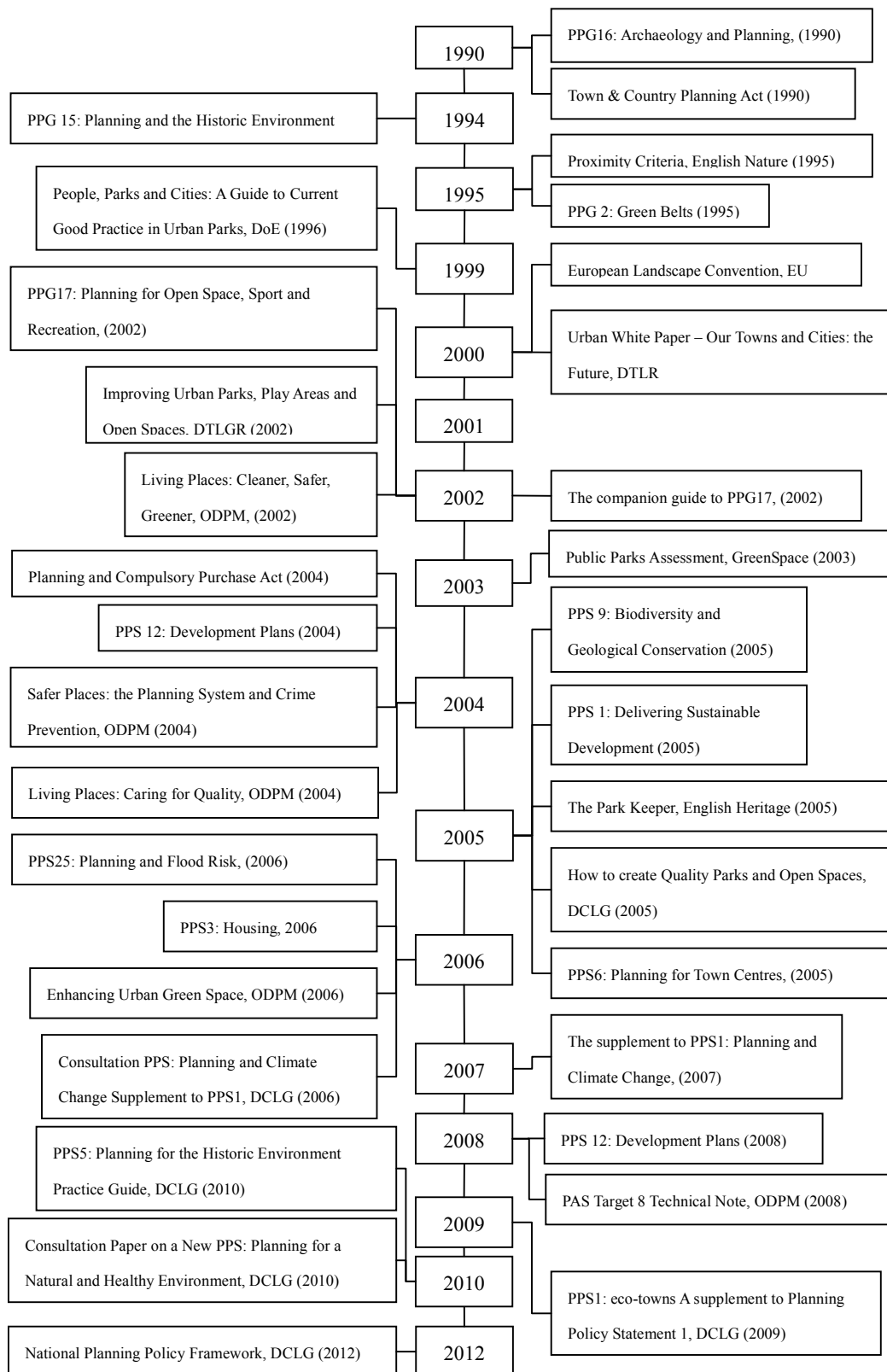


Figure 2.4.2: Time line for urban green space reports and policy documents (adapted from ODPM, 2006; Wilson and Hughes, 2011)

2.4.2.1 General background

In the 1990s, planning legislation in England and Wales was primarily incorporated in the Town and Country Planning Act (1990). This provided the central legislative framework for the land use planning system (Bath City Council, 2007). The Act included forward planning and development control, and identified who was responsible for decision making (Bath City Council, 2007; HMSO, 1990; Planning Help, 2012). The Town and Country Planning Act 1990 defined open space (DETR, 2001) and supported local authorities in preparing green space strategy.

Later, the Planning and Compulsory Purchase Act 2004 introduced statutory regional planning and replaced old style Local Plans and Unitary Development Plans with Local Development Frameworks at the local level (Planning Help, 2012, online). Further, the Act also initiated a move from Planning Policy Guidance (PPG) to Planning Policy Statements (PPS) at the national level (Natural England, 2012). According to the 2004 Act, the planning system has a clear chain of conformity from national through regional to local planning (Natural England, 2012). It also strongly promoted the planning as a positive tool, which could be used to integrate environmental, economic and development criteria with policy.

Our Towns and Cities, the Government's Urban White Paper, was published in 2000. This Paper (ODPM, 2000) promoted an agenda of urban renaissance and highlighted the role of public open spaces to support healthier lifestyles. According to the Urban White Paper 2000, the UK government outlined a vision to develop better places and offer a high quality of life and opportunity for all people. It also promoted the development of a holistic view of planning, and drew attention to the economic, social and environmental values of grey and green infrastructure within the process of urban renaissance.

At the national level, there were a series of planning policies (PPG/PPSs) (Table 2.4.1) and supplements that provided guidance on statutory provisions and links to wider government

policies in the UK. Planning Policy Guidance (PPG) put urban renaissance at the heart of the planning system. Planning Policy Statements (PPS) set out the government's national policies on different aspects of land use planning in England. They outlined how the planning system could help achieve wider government aims and objectives (Bath City Council, 2007). Table 2.4.1 shows the relevant key PPGs and PPSs which are particularly relevant to sustainable development and enhance the natural and built environment.

Planning Policy Guidance 17 (PPG17) was originally published in 1991 and revised in 2002 to set out the policies on the consideration of open space, sport and recreation matters in relation to the planning system. PPG 17 was fundamental to delivering broader government objectives and gave guidance on a range of planning issues relating to quality of open spaces, sport and recreational facilities. For example, it included supporting an urban renaissance, supporting a rural renewal, promotion of social inclusion and community cohesion, health and well-being and promoting more sustainable development (ODPM, 2002).

The importance of PPG 17 is that it set out the criteria to guide local authorities in assessing their proposals for development of urban green space (House of Commons, 2006). Moreover, PPG 17 provided a broad typology of urban green spaces to help local authorities to use in their assessments. It also stated that open space standards were best set locally and promoted a local strategy and the development of green space policies within the local development plan.

According to PPG 17, local authorities got opportunities to adopt strategic approaches and plan positively for the provision and enhancement of open spaces and recreational and sporting facilities (DETR, 2001).

In 2012, Planning Policy Guidance and Planning Policy Statements were replaced by the National Planning Policy Framework (NPPF). The NPPF consolidates and streamlines previous national planning guidance. Through this change of policy, NPPF allowed local councils to modify and deliver their local policies with more simple processes. This framework reforms to make the planning system less complex and easier to understand

(DCLG, 2012a, online).

Further, the NPPF also addressed interest to develop economic growth and sustainability. This change therefore provides an idea to deal with declining economic sources for local authorities in managing green spaces. Moreover, the NPPF strongly reinforces the planning system as a way to improve developing sustainability and allowing for community engagement (Town & Country Planning Association and The Wildlife Trusts, 2012).

Generally, in English context, development of urban green spaces has been considered and promoted over a long term through developed planning policies. In the last thirty years, planning and policies in English context provided a series of promotions to encourage and promote green space development including rural and urban areas. These planning policies drew views from environmental benefits to economic, cultural and social values. Significantly, PPS and PPG supplied opportunities for local authorities to improve their quality of green spaces in England. PPG 17 also provided a green space classification to guide local authorities to manage their green and open spaces.

Even though, the NPPF replaced PPG and PPS in 2012, the NPPF brings attention to green infrastructure development and sustainability. This document was less complex and supplied notions to make it easier to understand, and reduced the number of policy pages about planning (DCLG, 2012a). Hence, the developed planning framework therefore brings urban green space with awareness, value into planning system.

Table 2.4.1: Relevant PPG & PPS		
Planning Policy (PPG/PPS)	Overview	Year
PPS1: Delivering Sustainable Development	Sets out the overarching planning policies on the delivery of sustainable development through the planning system.	ODPM, 2005
PPS1 Climate Change Supplement	Sets out how spatial planning should contribute to reducing emissions and stabilising climate change (mitigation) and take into account the unavoidable consequences (adaptation).	DCLG, 2007
PPS1 Eco Towns Supplement	Sets out a range of minimum standards which are more challenging and stretching than would normally be required for new development.	DCLG, 2009
PPS7: Sustainable Development in Rural Areas	Set out the Government's national policies on different aspects of land use planning in England. The policies apply to the rural areas, including country towns and villages and the wider, largely undeveloped countryside up to the fringes of larger urban areas.	ODPM, 2004
PPS9: Biodiversity and Geological Conservation	Expects planning to contribute to a better quality of life and to people's sense of wellbeing by enhancing biodiversity in green spaces.	ODPM, 2005
PPS12: Creating strong, safe and prosperous communities through Local Spatial Planning	Sets out what the key ingredients of local spatial plans are and the key government policies on how they should be prepared.	DCLG, 2008
PPG17: Planning for Open Space, Sport and Recreation	Requires authorities to plan for open space by undertaking robust assessments of the needs of their communities and by auditing existing provisions. Where authorities have not yet completed this work, open space may only be built upon where it has been demonstrated that it is surplus to requirements.	ODPM, 2002
PPS25: Development and Flood Risk	Sets out Government policy on development and flood risk. Its aims are to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas of highest risk.	DCLG, 2006
PPS 5: Planning for the Historic Environment	Sets out planning policies on the conservation of the historic environment.	DCLG, 2010
PPG 2: Green Belts	Sets out Green Belt land-use objectives and outlines the presumption against inappropriate development.	ODPM, 1995

2.4.2.2 Discourse of organizations in landscape management

On the other hand, some important research and reports are undertaken by government and other organisations. These groups have importantly impacted the development of urban green spaces in England. They have essentially promoted and studied landscape development in UK and particularly bring many promotions and knowledge into landscape practices. The following part explained some influential organisations in development of green and open space.

In England, government departments drive to develop urban green spaces within planning systems. Since the 1990s, the relevant department in English government has been responsible for enhancing green spaces in urban areas, for example, the Department of the Environment, Transport and the Regions (DETR), in 1997 was in charge of environment which included the administration of urban green space development. This department was renamed from ‘the Secretary of State for the Environment, Transport and the Regions’ which was established in 1997 and joined responsibility for environment (The National Archives, 2013, online). In 2001, the department was renamed as the Department for Transport, Local Government, and the Regions (DTLR). This change merged the environment portfolio with the Ministry of Agriculture, Fisheries and Food in the Department, Food and Rural Affairs. However, the DTLR was still responsible for management of urban green space.

Nevertheless, in 2002, the Department for Transport, Local Government and the Regions was separated and transferred to the Office of the Deputy Prime Minister (ODPM) which undertook a role for developing urban and green spaces, planning and relevant policy-making. During 2006, the ODPM became the Department for Communities and Local Government (DCLG), which is the UK Government department for communities and local government in England, and is the successor to the Office of the Deputy Prime Minister. The DCLG provided policy to move decision-making power from central government to local councils and brought views to enhance quality of environment and urban green spaces (DEFRA, 2013, online).

During the period of ODPM, the ODPM had realised the decline in quality of urban green space in England, and promoted a series of research and policy to enhance the quality of urban green space, for example, research of Enhancing Urban Green Space, the Urban Taskforce Report and the Urban White Paper. Further, PPG and PPS also issued in that period (during 2000 to 2010), and encouraged local authorities to develop the quality of urban green spaces.

Further, in England, a range of organisations essentially help to improve the development of urban green spaces in both academics and practices (Table 2.4.2). For example, Commission for Architecture and the Built Environment (CABE), was an executive non-departmental public body of the UK government, and has national impact by working through a network of industry specialists, design associates and built environment experts (CABE, 2013, online). Since 1999, the CABE has worked to bring rich experiences and practices to the design and management of urban green space, public spaces in towns and cities in England (CABE, 2011a, online). In particular, the CABE published a series of publications and practice guides for practitioners and promoted participation and quality tools, such as the Green Flag Award. Additionally, this group have also worked with a range of researchers to take skills crisis in the green spaces sector for improving green space skills in management (CABE, 2011a, online). However, in 2011, the core funding of CABE by the Government was ended. The CABE therefore, was merged into the Design Council, however, it still supports local authorities to help to deliver and shape places and spaces for meeting needs (CABE, 2013, online).

Largely, in the last two decades (since the 1990s), the government has essentially recognised the impact of urban green space, and had a series of actions and policies to improve the quality of urban green space. Although the government departments have been changed over the last twenty years, the government clearly sets responsibility for planning, management on development of the city, including improvement of urban green space, development of community and brought notion of green infrastructure into policy (in NPPF).

Furthermore, in England, a series of organisations play an important role to develop and improve urban green spaces, and bring rich experiences to enhance skills in design, planning

and management for practitioners in national level. In this condition, improvement of urban green space is essentially supported by both government and organisations in England.

Organization Name	Role & Function	Other	
The Landscape Institute	As a professional body and educational charity, we work to protect, conserve and enhance the natural and built environment for the public benefit.	The Royal Chartered institute for landscape architects.	
CABE	<ul style="list-style-type: none"> - Was the government's advisor on architecture, urban design and public space in England - Influence and inspire the people making decisions about the built environment - Championed well-designed buildings, spaces and places, ran public campaigns and provided expert, practical advice 	1999-2011, was merged into the Design Council in 2011	
English Nature	The non-departmental public body of the UK government responsible for ensuring that England's natural environment, including its land, flora and fauna, freshwater and marine environments, geology and soils, are protected and improved.	1990-2006	Merged with Natural England
Countryside Agency		1999-2006	
Natural England		2006-now	
GreenSpace	To be the UK's leading advocate for the economic, social and environmental benefits of better planned, designed and managed parks, gardens and green spaces and for their positive contribution to our economic, physical and spiritual health, to social cohesion and to biodiversity.	(1999-now)	

2.4.3 Landscape policy context in China

This section explains the policy context in China. In China, the main structure of green spaces policies is divided into three levels: national level, regional level and city level. The studied policies and documents in this section will mainly focus on national level. The national documents include some basic laws in China and some regulations, which are all related to landscape and green spaces. The national documents are the main guidance for sub-governments in China. Therefore, this part analyses the Chinese policies framework on the national level.

This section includes two parts. First part generally described the background of Chinese political context and the structure of governance in China. Second part attempts to provide a framework of landscape policies in China, which includes legislation, national documents and standards. This analysis prospected to present general conditions of urban green space policy context in China.

2.4.3.1 General Governance Structure in China

Before analysing relevant policy context in China, a general governance structure about landscape and planning in China should be explained for better understanding. In China, planning administration system contains plan making, approval and implementation. As Urban and Rural Planning Law of the People's Republic of China (URPL) (Standing Committee of the National People's Congress, 2007) stated, the administration of planning and policy includes different levels from national to local. Figure 2.4.2 presents a general structure of relationship and responsibility of planning departments in different levels in China. The Central Government of China is the top and responsible for managing and leading all departments in the whole country. Under the Central Government of China, Ministry of Housing and Urban-Rural Development of the People's Republic of China and State of Forestry Administration, P. R China are national departments.

Ministry of Housing and Urban-Rural Development (MHURD) is responsible for administrating and organising planning for urban development including rural and urban in the whole nation, building and housing development, construction and civil infrastructure, monitoring and measure (Wu, 2005). This department is also responsible for improving and developing green and open spaces. Furthermore, the department has responsibility to make national development strategies with urban planning, policy and regulations, and implements national and regional land use policy, including the location and layout of key state projects and feasibility studies. For example, it promoted the National Garden Award to improve the quality of urban green spaces throughout the nation, and encouraged local governments to manage their green spaces for improving quality in China.

Additionally, the State of Forestry Administration in China is specifically responsible for managing forest and woodland resources in China. This department also has responsibility to manage and develop biodiversity, and protect natural resources, such as conservation of wildlife.

Although these national departments both play a role for green spaces, development of urban green space is generally managed by the Ministry of Housing and Urban-Rural Development which has the ability for relevant landscape policy-making.

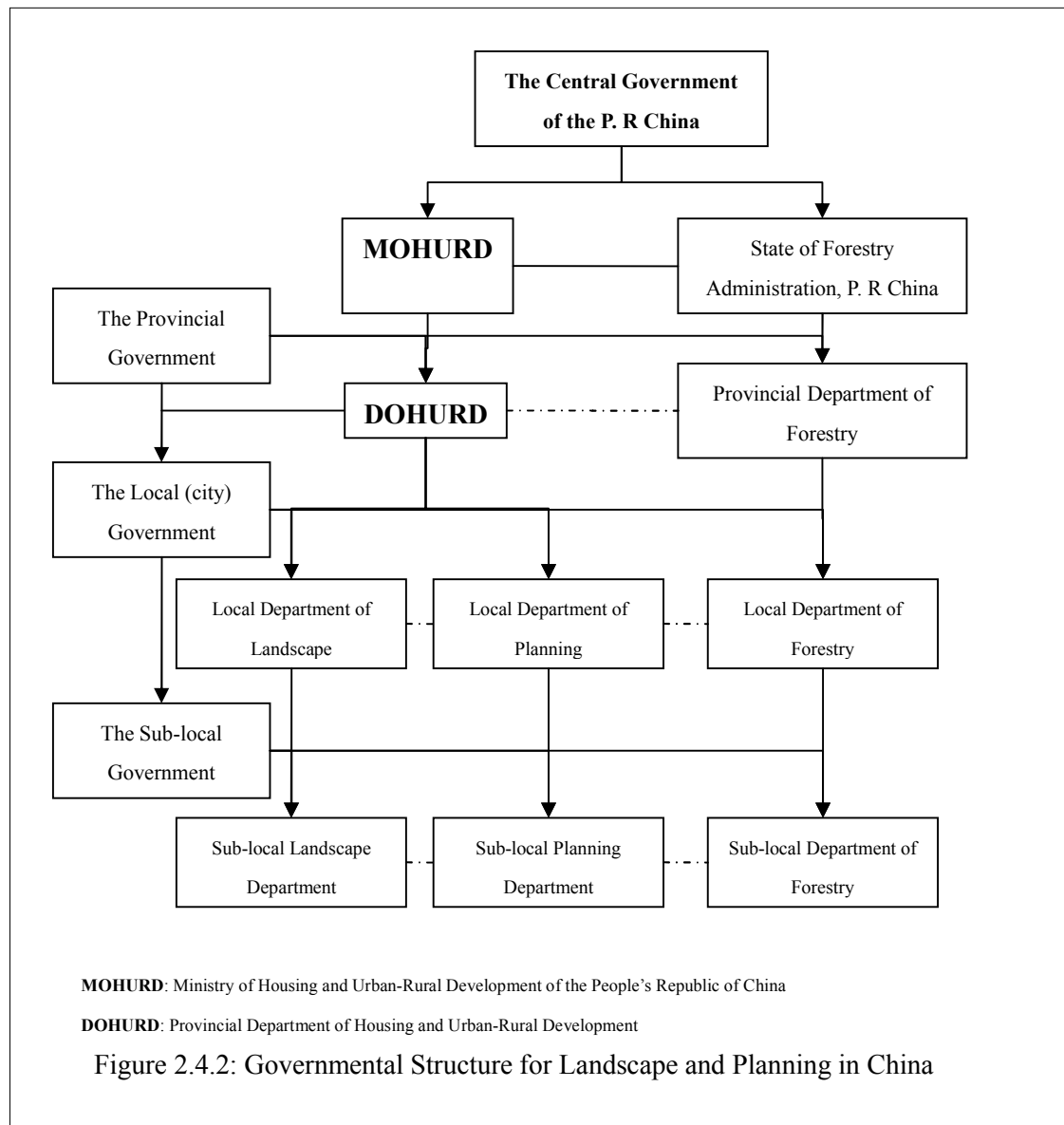
At provincial level, the provincial government administrates the development of their own regions. In each province, specific government sectors are responsible for planning making, implementation and measure, harmonising urban and rural spatial layout, improving people's living environment and integrated development of urban and rural society and economy, Provincial Department of Housing and Urban-Rural Development (DOHURD) is led by the Shanxi Province Government, and is responsible for administrating planning, approval and implementation in provincial regions. Besides, similarly to national government structure, there is a department of forestry in province government. Its responsibility is similar to national department, and has many detailed tasks to administrate forest and woodland sources

in provincial regions.

Under the province government, at city level, local government has a specific department of landscape in some cities. The landscape department, planning department and forestry department have a duty to planning and policy making, implementation and measure in specific areas of responsibility in their own city. The landscape department and planning department generally administrate urban areas. Specifically, only the landscape department is responsible for administrating and developing urban green space in urban areas (including various districts and towns).

Further, at district level, in every district and town, each local government also has specific sections about planning and forestry. In some towns and districts, local government also set up landscape section to manage and maintain their own green and open spaces.

As a whole, the general governance structure of landscape and planning in China primarily contains three levels, as national, provincial (regional) and city level. Further, each city also contains various districts and towns. Therefore, district (town) government might have specific a section that is responsible for landscape development. However, the landscape section is not set up in all districts or towns by local government. Hence, the Landscape department in city government is considered as basic level to manage green and open spaces in built up areas (urban areas).



2.4.3.2 Policy development for landscape in China

This section explains relevant national policies and government documents from China. It contains two levels from national to provincial level. The national documents include some regulations and basic laws for the planning and development of landscape in China. Some regulations impact on the development of landscape and green spaces. These national documents are mainly used to guide sub-governments for developing and managing landscape in their own regions in China.

The regional documents in this study are published by Shanxi Province Government. All these documents are referenced and ensure relevant national documents and are used for managing their planning and development by sub-governments in Shanxi province.

As described in the previous section, planning policy includes different levels from national to city level. In this context, policy at national level usually contains national laws and regulations, and at provincial and city level, policy usually includes local regulations and bylaws. Furthermore, based on different types and status of law and regulation, there are three groups of regulation: administrative regulation, departmental regulation and other national documents with a general binding force (see Table 2.4.3) (Lin and Yang, 2010). However, this table does not include Urban and Rural Planning Law of the People's Republic of China which is a basic law for urban and rural planning, including planning, implementation and measure.

The Urban and Rural Planning Law of the People's Republic of China is *“formulated for the purpose of strengthening urban and rural planning administration, harmonizing urban and rural spatial layout, improving people's living environment and promoting the integrated, harmonious and sustainable development of urban and rural society and economy.”* (Standing Committee of the National People's Congress, 2007, Article 1)

As a basic law, it guides all activities of planning, design and management in China. This law provides an administration system for planning and implementation. Moreover, it also

provides the rule of qualification of planning organisations to take planning tasks, for example, what kind of planning institutions and companies have the ability to take on a planning and design project. This law also has clear articles for planning permission, approval and implementation procedures at local government level and every local government and authority must abide by it.

The Urban and Rural Planning Law of the People's Republic of China was upgraded from City Planning Law of the People's Republic of China in 2008. Before the Urban and Rural Planning Law, the City Planning Law was a basic law since 1990 (Standing Committee of the National People's Congress, 1989). Similar to the Urban and Rural Planning Law, the City Planning Law played the same role in the planning system, and was formulated to determine the size of a city, defining the orientation of city development with economic and social goals (Standing Committee of the National People's Congress, 1989). However, the City Planning Law only concentrated on cities without rural areas and small towns (see Standing Committee of the National People's Congress, 1989, Article 1, 3). After 2008, the Urban and Rural Planning Law replaced the City Planning Law, and concentrated planning and policy on rural and urban areas, and especially improved the measurement and monitoring of planning (see Standing Committee of the National People's Congress, 2007, Article 3, 24).

Nevertheless, this law is mainly designed for planning and city development with social, economic and spatial development. It is not a specific law for landscape. Within this background, Table 2.4.3 presents relevant regulations about development of green spaces in China.

Urban Green Regulation (The State Council China, 1992) is a national regulation to guide planning, management, conservation and measure of green spaces. This regulation provides three perspectives to develop and increase green spaces in urban areas: planning & building (construction), conservation & management and penalty provision.

The regulation clearly states that the Green Space System Plan should be made by the local

government in each city, as part of an Urban Master Plan. Through the Urban Green Regulation, broad ideas about urban green space were delivered for local authorities, for example, considering local characteristics like landform, water bodies, vegetation and historical and cultural sites (The State Council China, 1992).

Moreover, this regulation provides requests for qualification to undertake greening task, and delivered approval procedures. Further, the Urban Green Regulation also sets provisions to identify who are responsible for different green spaces in urban areas, for example, public green spaces, parks and greenbelts, waters and vegetation are managed by the related department in local government such as landscape department, and other institutional green spaces are managed by their owners. However, as administrative regulation, the Urban Green Regulation cannot cover all fields of urban green space development. The regulation only concentrated on urban green without landscape notion (Lin and Yang, 2010).

Furthermore, in China, there is also a series of departmental regulations and documents which are issued by the Ministry of Housing and Urban-Rural Development in the Central Government of China (Table 2.4.3). These regulations and documents cover various phases in administrating and developing urban green spaces. Especially, the Measures for the Administration of City Green Line (MOHURD, 2002) is used to administrate and measure management of urban green space boundaries.

Some documents are specifically published for managing parks and gardens with greening notions. Additionally, the government has realised the importance of urban green space, and aims to encourage local authorities to improve the quantity and quality of green spaces in urban areas. National Garden City Award, as a way of increasing the quality and quantity of urban green spaces, has promoted been throughout the country. Application and Criteria Method for National Garden City (MOHURD, 2010c) and Criteria of National Garden City (MOHURD, 2010b) are published to guide and evaluate applicant cities in achieving the National Garden City Award. Through these two documents, a series of indicators with details set for improving the quality and quantity of urban green spaces in urban areas. Further, in order

to ensure implementation, Evaluation Standard for Urban Landscaping and Greening (MOHURD, 2010d) provides standards to evaluate and measure urban landscaping and greening. For example, this document provides indicators for comprehensive management, green line control, construction management and monitoring, ecological environment and urban infrastructure.

Generally, national policies for landscape and management have been concerned and promoted by the Central Government of China over a long time. However, these policies are very concentrated on urban greening, and lack view for landscape development (Lin and Yang, 2010). Further, these documents are regulations and national government documents with a general binding force, and are difficult to play a role as a law for leading legal relations in landscape (Lin and Yang, 2010). Nevertheless, these policies have functions to encourage local authorities addressing views for improving quality, quantity and services of urban green spaces.

Table 2.4.3 Relevant governmental regulations and documents for landscape and greening in national level in China (1990—2010) (Adapted from: Lin and Yang, 2010)

Administrative regulation	Departmental regulation	Other national documents (with a general binding force)
Urban Green Regulations (2002) 城市绿化条例(1992年)	The provisions on the administration of City Zoo (1994/2001/2004) 城市动物园管理规定 (1994年/2001年/2004年)	建设部关于加强古树名木保护和管理的通知(1991年)
		Notice on strengthening the protection and management of old and famous trees (1991)
		城市古树名木保护管理办法(2000年)
		Measures of Management of Old and Famous Trees (2000)
		建设部关于印发《城市绿化规划建设指标的规定》的通知(1993)
	The provisions on the administration of the amusement park (2001) 游乐园管理规定(2001年)	Notice on Indicators of Urban Greening and Planning (1993)
		关于加强城市绿地和绿化种植保护的规定(1994年)
		Provisions on Strengthening Conversation of Urban Green Space and Green Planting (1994)
		建设部关于动物园野生动物易地保护工作的通知(1993年)
		Notice on Zoo's Wildlife Situ Conversation Work (1993)
关于加强公园管理工作的意见(2005年)		
Advice about Strengthening Park Management Work (2005)		
The measures for the administration of city green line (2002) 城市绿线管理办法(2002年)	国家城市湿地公园管理办法(试行)(2005/2010年)	
	National Wetland Park Management Measures (Trial) (2005/2010)	
	国家重点公园管理办法(试行)(2006年)	
	National Key Park Management Measures (Trial) (2006)	
	关于建设节约型城市园林绿化的意见(2007年)	
	Advice about Development of a Conservation Oriented Urban Landscape and Greening (2007)	
	关于加强城市绿地系统建设提高城市防灾避险能力的意见(2008年)	
	Advice about Enhancing Urban Green Space System and Improving Ability of Urban Disaster Prevention (2008)	
	城市绿地系统规划编制纲要(试行) (2002年)	
	Outline of Urban Green Space System Planning (Trial) (2002)	
城市湿地公园规划设计导则(试行)(2005年)		
Design Guidance of City Wetland Park (Trial) (2005)		
城市园林绿化企业资质标准(1995/2006/2007/2009年)		
Qualification Standard of City Landscaping Enterprises (1995/2006/2007/2009)		
中国国际园林博览会管理办法(2007/2009年)		
The Measures of (China) International Landscape Exposition Management (2007/2009)		
国家园林城市申报与评审办法(2005/2010年)		
Application and Criteria Method for National Garden City (2005/2010)		
城市园林绿化评价标准 (2010)		
Evaluation Standard for Urban Landscaping and Greening (2010)		

2.5 Conclusion

This chapter has outlined relevant concepts that are closely related to landscape management, and have essentially impacted improvement of multifunctional green infrastructure, in both research and practice. The chapter has also analysed the national policy context in UK and China to explain general development and changes in landscape management.

Urban green space, as the primary concept, has been studied within large literatures and many practices. Its roles and benefits are also reviewed for understanding of enhancing quality.

Green infrastructure as a new term of green space is recognised as a network of multifunctional green space from rural to urban. Green infrastructure is capable to deliver a wide range of environmental, social and economic benefits for quality of life. Furthermore, this concept has been promoted in policy context and practices in various regions, such as NPPF in UK, Green Infrastructure plan in Greater Manchester Project and green infrastructure planning in Australia (Australian Institute of Landscape Architects; DCLG, 2012b; Landscape Institute, 2009b; Nolan, 2010)

In order to promote green infrastructure in practice and research, principles and typology of green infrastructure are also studied in this chapter. Identified principles and typology of green infrastructure therefore are promoted as a framework for development of green infrastructure in this thesis.

Landscape multifunctionality, as a main aspect of green infrastructure has been developed over a period, and was originally developed from agricultural landscape, and has been extended to urban landscape. This concept has been summarised with key functions via a range of researches and practices, such as Ecological (as an area for living), Economic (as an area for production), Socio-cultural (as an area for recreation and identification), Historical (as an area for settlement and identity), and Aesthetic (as an area for experiences) (Brandt et al., 2000). Besides, the CLERE model restated the concept of multifunctionality for promoting

management in practices. It brought a multifunctional notion into landscape management.

Landscape management has been discussed with effects and key features which enable the improvement of multifunctionality for quality of urban green spaces. Landscape management ensures the social, environmental and economic quality and benefits can be achieved over a long time and remain in the future, and helps to create high quality of urban green spaces (Dempsey and Burton, 2012). Besides, as a way of achieving multifunctional green infrastructure, landscape management provided services and potential for further development.

As a management tool, the CLERE model has been discussed to understand how management actions can help to enhance multifunctionality in urban green spaces, and also provided a notion for achieving quality of urban green space through management by local authorities.

Additionally, this chapter also analysed a series of fundamental features for achieving quality of management from literature review, including political resource, skill training, budget, understanding and community impacts.

In conclusion, this chapter has analysed relevant key concepts to provide a theoretical framework for management of green infrastructure. Green infrastructure therefore is considered to use CLERE model in management for achieving multifunctionality. Further, with explanation of landscape management and its role and benefits, key features have also been launched for understanding of improving quality of management. This chapter has also shown the policy context in UK and China at national level for understanding the development of landscape management in policy conditions.

Chapter 3: Research Methodology

3.1 Introduction

As chapter one described, the aim of this thesis required using a range of methodological techniques to investigate the potential opportunities and knowledge exchange in landscape management. Therefore, this study considered three ways to determine the research purposes: literature review, GIS mapping and interview. This chapter is divided into two parts.

First, in order to understand research approaches, the first explains why these methods were selected. It describes the chosen methods and explains the research process.

The second part explains the way of literature review including types of literature and what respects of literature are considered, such as academics, policies and practices. This part also explains where resources come from. Then the nature of case study control explains the selection of case studies. It also provides further details about the process, including the use of GIS to map of current and potential green infrastructure, and the conduct of interviews.

3.2 The Methodological approach

The purpose of this research, as explained in Chapter 1, is to try to determine the scope for improving landscape multifunctionality through landscape planning. It aims to investigate the nature of multifunctionality, actually and potentially, in urban green spaces. Hence, it is necessary to understand the notion of landscape management and related concepts. Most appropriately, this is achieved by systemic literature study focusing on research outcomes, methods, theories and applications (Cooper, 1989).

This stage comprises a survey of relevant articles, books and other sources pertaining to the research topic (Henrichsen et al., 1997). The study of professional literature, in addition to peer review sources, can help the researcher to understand the process of landscape management and identification of key concepts and definitions. It also could give the necessary background to understanding current conditions in the case studies.

This thesis aims to explore both knowledge exchange (what can be improved) and practices (what people do), using a range of geographic methods. To investigate the nature of multifunctionality in urban green spaces, a paired case study approach has been used. This part of the study mainly concentrates on explaining and comparing management practices in urban green spaces for improving multifunctionality. Further, it addresses the pursuit of particular landscape functions and considers different management role.

Case studies are widely used in most professions including medicine, law, engineering, business, landscape, planning, and architecture (Francis, 2001). Francis (2001) points out that case studies have developed within the social sciences and are frequently used in landscape, environment and management studies. Case studies are also sometimes used to explain theories related to practices or phenomena. In order to understand landscape functions and potential prospects in management practices in general, a comparative case study is more useful than a single case study.

Many research projects which measure and compare multifunctionality have used a Geographic Information System (GIS) to map the context of urban green spaces, often attempting to measure different functions afforded by spaces (Alonso et al., 2007; Kong et al., 2007; Lee et al., 1999; Peccol et al., 1996; Xiang, 1996).

GIS technology offers an opportunity to link the various types of information derived from source records. It has supported the development of landscape study since the mid-1980s (Kong et al., 2007). One of the most basic advantages of a GIS method is to position properties on a local map in terms of their geographic coordinates (Kong et al., 2007). Spatial statistics within GIS based on digitized data have made it possible to analyse accurate, consistent and unbiased explanatory variables, for example accessibility to public green spaces, in a fast and efficient manner (Kong et al., 2007).

Furthermore, landscape management activity is often studied by quantitative analysis that involves building up a database of digital data and social surveys. This can provide data to illustrate landscape functions and conditions of urban green spaces with their management, and assumptions about the status of management. However, in practice the potential complexity of social context and data veracity in the mapping process is sometimes overlooked (Ling et al., 2007). For example, classifying urban green spaces in large scales might miss small green plots (Phua and Minowa, 2005).

Monitoring might also provide information for understanding management outcomes (Tongway and Hindley, 2005). In order to understand implementation and monitoring in the management process, feedback is necessary. The chosen feedback method reviewed interviews conducted with selected groups. The use of interview is appropriate when that research is particularly in the interviewee's point of view (Bryman, 2004). The interviewees are able to range over varied aspects of landscape planning, management and implementation to explain how they implement and monitor their management policies and actions.

3.2.1 Literature approach

Literature study is especially important in the research process. It codified common sense, a refinement of ways that might be used to describe and explain aspects of related research (Robson, 2002). The literature study can help the researcher to acquire an understanding of the research topic, what has already been done on it, how it has been researched and what the key issues are. According to systemic literature study, the researcher expects to show the understanding of the research topic. It shows that researchers have understood the main theories in the subject area and how they have been applied and developed the main evaluations that have been made of work on their topic (Bell, 2005).

Reviews of literature are particularly valuable as means of gathering comprehensive evidence on a particular question. They provide a key source of evidence-based information to support and develop practices (Petticrew and Roberts, 2006). According to this review method, this study has selected articles that centre on testing or comparing methods of promoting urban green spaces and green infrastructure. These selected articles are also used to examine various typical issues in the green infrastructure approach.

Literature has been selected where it has an understanding of urban green space practices in studied cities, and summarised both successful experiences and lessons (Huang et al., 2009). As a systemic documental study, the selected literature has covered a range of outputs in the relevant area including general background, peer review studies, and relevant policies (Bastain and Roder, 1998). In order to assess landscape functions and management practices, it is also necessary to consult a broader literature surrounding the evaluation process.

Also, Huang et al (2009) have pointed out that maintaining and enhancing the function of urban green space requires an effective public policy and institutional framework. The implementation of policies and management needs effective policy assessment, administrative efficiency and co-ordination (Huang et al., 2009). Therefore, it is necessary to compare relevant policies at different levels and the management plans used in the case study areas.

These have also therefore been included in the review of literatures.

3.2.2 Using Case study

Case studies are widely used in most organisational studies of professions. It enables the researcher to investigate important topics which are not easily covered by other methods. Case studies are used to understand or investigate a descriptive question (what happened?) or an explanatory question (how or why did something happen?) (Yin, 2003). They can also explore sources of practical information on potential solutions to difficult problems for researchers and practitioners.

Further, comparative case studies are appropriate to study actual and potential prospects in landscape management practices. Comparative study might help to strengthen the findings from cases, because they can help to define the domain within which the research purpose is valid more (Johansson, 2003).

In this case, a paired case study is used to compare and measure landscape management processes in urban green spaces in two cities. In order to measure their condition, GIS mapping methods and interviews are used in the research process.

3.2.3 GIS mapping approach

Geographic Information System (GIS) technologies are computer tools for analysing landscape by collecting, storing, retrieving, transforming and displaying spatial data (Lee et al., 1999). GIS can quickly access a large amount of data to link different datasets and analyse their inter-relationships (Peccol et al., 1996). Peccol et al (1996) point out that GIS mapping is often necessary to establish the distribution and coincidence of resources to demonstrate landscape functions. GIS can create needs based assessments around social, economic, environmental and access aspects of green infrastructure. (Landscape Institute, 2009b).

Various mapping methods have been developed to understand and analyse the context and opportunities of development of green infrastructure (Davis, 2010). In this context, the GIS maps and planning zone maps may be considered as layers of spatial data within the system. For example, the former Countryside Agency (now part of Natural England) and Scottish Natural Heritage use GIS as a tool to research broad assessment of landscape character types.

As a responsive and adaptive approach to landscape research and the primary tool for data analysis, the GIS method is highly relevant to the research aims and the context of this study. It is essential to use GIS mapping tools to understand the distribution and quality of urban green spaces for delivering wider functions (CABE, 2009d). According to this method, researchers can know how many green spaces are in the study area, where they are, who owns them or what they are like (CABE, 2009b). When using spatial analysis on multifunctional landscape datasets, the location, extent and rate of change in landscape may be investigated (Peccol et al., 1996).

Furthermore, within GIS spatial databases, researchers can understand and investigate two key aspects: the relationship between land use processes and changes and landscape management policies; the extent of environmental impacts and the influences of natural conditions and human activities in urban green spaces (Alonso et al., 2007). Moreover, gaps within these urban green spaces can also be explored via GIS maps (Sheffield City Council, 2010a).

Urban green space comprises various landscape elements. These elements include both natural elements (such as soils, water courses, vegetation and topography) and man-made features (roads, houses, quarries, hedges and fences), all of which may be captured by a GIS (Peccol et al., 1996). As Peccol et al (1996) summarised, GIS can be used in the assessment of existing landscape functions and creation of new points.

Depending on the nature of the collected data, geographic elements can be mapped to present physical context of urban green spaces in the study area. Also, related statistical data on demography, health care and land use can be collected. According to the analysis of relevant

bibliographic and cartographic materials on the study area, the effectiveness of the management process can be greatly improved, and future planning and monitoring will benefit greatly through its use (Deng et al., 2006).

3.2.4 Interview

The interview, as a research method, typically involves the researcher asking questions and hopefully receiving answers from selected participants (Robson, 2002). The interview typically denotes an unstructured or semi-structured approach. In an interview, the person interviewed is altered much more flexibility of response. The interviewees may provide highly relevant and insightful comments in the interview. Also, interviewers can depart significantly from their schedule or guide. They might ask new questions that follow up interviewee's replies and can vary the order and even the wording of questions (Bryman, 2004).

3.2.5 Research methodology framework

A methodological framework has been developed (illustrated in Figure 3.1) which is based on these selected research methods. It includes three main methods to achieve the research aims. First, literature study is used to understand relevant concepts and current contexts in the landscape management process, relevant policies and practices in the selected study areas.

Second, GIS is used as a method for mapping urban green spaces in the study areas. Here, the distribution and status of urban green spaces is illustrated through the production of maps. Moreover, GIS analysis is used to relate social data to aid understanding of patterns of functions in urban green spaces. It also attempts to use visual data and produce maps to investigate management issues and potential prospects.

Within this framework, two cities have been selected for study. The first is Sheffield in the UK and the other is Yuci in China. Both have been studied by literature review and special analysis.

During the analysis process, feedback through interviews has also considered elucidated the management process.

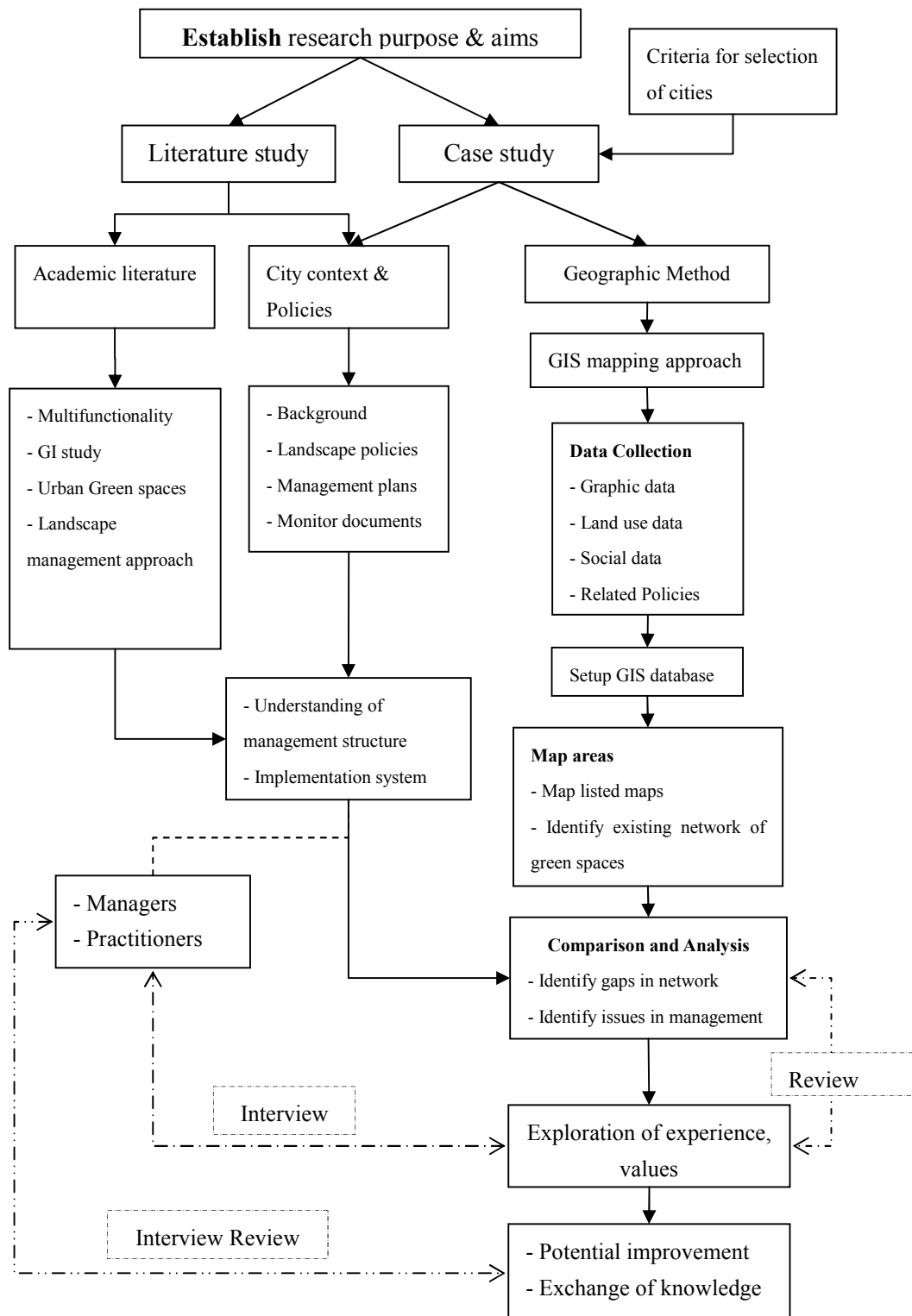


Figure 3.2.1: The Methodological Framework

3.3 Methodological components

3.3.1 Literature study

A conceptual framework is an explanatory device in narrative form, reviewing the main things to be studied. The process of establishing a theoretical framework shows how the research will be conducted and analysed. It often refers to the current state of knowledge in a subject derived from the published literature. Additionally, the critical review of the literature is necessary to provide researchers and readers with a picture of the state of knowledge and major question in the study subject (Bell, 2005).

Central to the method undertaken in this study is the understanding and evaluation of management for green infrastructure. In this study, the documents deal with landscape management to enhance green infrastructure in urban green spaces. Based on systemic literature study, researchers collect many facts, but then must select, organise and classify findings into a coherent pattern (Bell, 2005).

Before undertaking the literature review, key questions were posed. The main queries raised in the literature study were:

1. How landscape multifunctionality can be improved in urban green spaces through planning and management practice.
2. How the management and planning actions can help to enhance the green infrastructure.
3. What is the relationship between green infrastructure and other related conceptions?

Based on these points, the process of selecting literature is concentrated on landscape management study and practice in urban green spaces. For a systematic literature study, selected research engines are used to seek relevant academic literatures. Most of the English language literature can be collected through Web of Knowledge, Scopus and SwetsWise.

Springer Link also provides a lot of English resources, as well as some Chinese journals. Google Scholar engine was also consulted as it supplies a large amount of academic information, including peer review articles, books and websites.

Further, some important professional public websites are accessed (Table 3.3.1). Some governmental websites were also used to search related policies and strategies in this research (Table 3.2.2).

Database Name	Description
ISI Web of Knowledge (WoK)	Provides a single point of access and cross database searching capability for Web of Science and a range of other databases offered by Thomson ISI. Includes cited reference searching which is a powerful way of finding out who has published research on a particular topic.
Scopus	An abstracting and index database from Elsevier, designed to provide expert results for the non-expert researcher.
Springer Link	Providing researchers with access to millions of scientific documents from journals, books, series, protocols and reference works.
Swets Wise	A journal management system which provides access to a wide range of full text journals from a variety of different publishers.
Google Scholar	A freely accessible web search engine. It includes most peer-reviewed online journals of Europe and America's largest scholarly publishers.

Website name	Website address
CABE website	http://webarchive.nationalarchives.gov.uk/20110118095356/http://www.cabe.org.uk/
Landscape Institute	http://www.landscapeinstitute.org
Natural England	http://www.naturalengland.org.uk
GreenSpace	http://www.green-space.org.uk/
Green Keys	http://www.greenkeys-project.net/en/home.html
Green Infrastructure	http://www.greeninfrastructure.net/
Sheffield Wildlife Trust	http://www.wildsheffield.com/
Sheffield City Council	https://www.sheffield.gov.uk/
Landscape Department, Jinzhong in China	http://www.sxjzylj.com/

All of these search engines provided choices to limit searches by key words, date, authors and name of journals. The scope of the search is determined by the criteria set above. All UK and Chinese materials have been included in the review. Keywords used for the initial search arranged in Table 3.3.3:

Landscape functions	Urban landscape
Landscape management	Urban green space
Landscape planning	Urban green spaces
Landscape multifunctionality	Urban parks
Multifunctionality	Sustainable landscape
Multifunctional landscape	Parks
Green Infrastructure	Parks and green space
Green Network	Park management
Green spaces management	

In the process of literature collection, the selected literatures have been divided into two parts. The first part is academic literature, including relevant researches and practices. The second part relates to municipal context and background, policies and implementation of management in selected case areas.

The academic literature study was based on work to establish a theoretical framework showing development of green infrastructure and landscape management and its implementation. This was obtained from several types of resources (Table 3.3.4). This was aimed at identifying how green infrastructure can be planned, designed and managed as a network (Natural England, 2011).

Journal articles, English language	Books
Journal articles, foreign languages	Book reviews
Journalism	Conference papers
Online journals	Theses
Policies	Working Papers
Government documents	Survey database
Websites/online articles	

The academic review in turn, revealed the gaps about trending that are happening in the development of green infrastructure, for example practices of landscape planning and design. It also pointed out practices focused on landscape management to differences between landscape management and planning practice, and to the types of landscape functions that are being promoted and measured.

In practice-based studies, relevant city contexts and policies could be collected and reviewed to understand the processes of management of landscape. These showed how the practice of green infrastructure has been pursued by previous practitioners.

3.3.2 Case study methodology

This research aims to determine the scope for improved management for landscape multifunctionality in green infrastructure. It approaches this by using case studies in a paired comparison. The case studies begin with the research question set out in chapter one. Based on the research aim, it includes objectives to organise the evidence: (a) establish multifunctionality in urban green space and its components in the study areas and (b) management planning and implementation process in the cases. On the basis of the objectives set, a case with a particular set of characteristics will provide pertinent outcomes (Vaus, 2001).

When using multiple case studies, researchers should endeavour to treat each one as a single case so that researchers are able to establish a full account of that case before engaging in cross-case comparisons (Marrais and Lapan, 2004). On the other hand, the conditions associated with management implementation are also important because these could determine trends for the future. Cases with different backgrounds need individual understandings of landscape management practices and multifunctionality.

To define a case study, the study area needs to be determined. The length of time for the

investigation is another element setting the case study boundaries because research topics for case studies are dynamic topics that can be studied for years. Case studies need a sufficiently long period of time to collect data, analyse information, and report the results (Zainal, 2007). Further, the selections needed to identify places with varied urban landscape conditions.

Therefore, based on these principles above, two cities in different regions (China & UK) and their urban green spaces were considered as objects of comparative study to explore the nature and causes of difference in planning and management for landscape multifunctionality. The two cities are Sheffield (UK) and Yuci (in Shanxi province, P. R. China). This research utilises GIS as a mapping tool to identifying the extent, distribution and spatial variations in each type of green space in the case areas (TEP, 2007b).

3.3.3 GIS method

1. GIS methodology

Geographic Information System (GIS) and computer graphics techniques perform such functions as input and management of graphic and attribute data, query analysis of attributes related to urban landscape elements, and visual impact and analysis of development proposals (Oh, 2001). The tool offers the opportunity to link the various types of information derived from the source records. To determine form changes and the presence of urban green spaces, detailed land use maps and extensive field work have been conducted to illustrate these conditions in cities (Schmand, 1999).

Arc View 3.3 GIS software is the main tool which is currently used to manage spatial data in research (Pereira et al., 2011). GIS maps should show the condition of urban green spaces, relationship of spaces to each other and gaps between green spaces. The GIS mapping helps to clarify how many green spaces there are, where they are, who owns them or what their quality is (CABE, 2009d). It can identify gaps in the data, guiding further data collection, and help to

develop a freely accessible and searchable database (Bell et al., 2007). The GIS mapping method should make use of available information, including maps, datasets, and relevant policy frameworks (TEP, 2007b). The five-step mapping method promoted by TEP and the North West Green Infrastructure Unit (Butlin et al., 2011) has been particularly useful for the present research (Figure 3.3.1). The following sections elaborate on these steps.

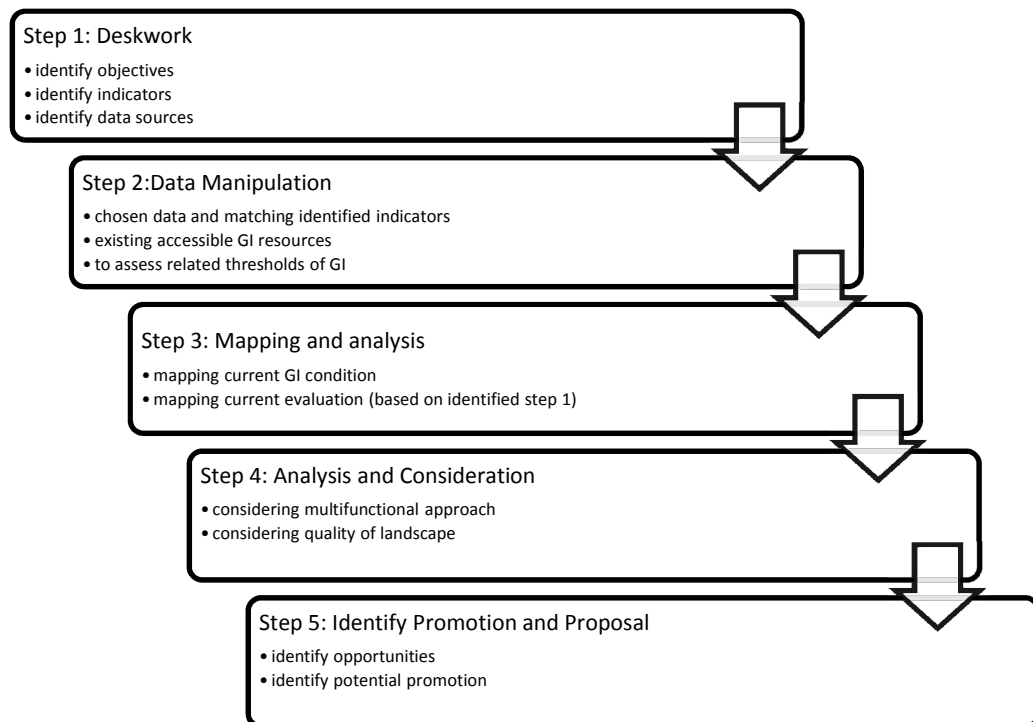


Figure 3.3.1: Green infrastructure mapping and evaluation methodology
Adapted from: TEP (2007)

Step 1: Deskwork

(1) Identify objectives

In the light of research aims and research methods, the deskwork was undertaken at the outset of the study. It considered what kind of data should be collected is core work in the desk study. The analysis of urban green spaces is generally based on a variety of sources, including land use maps, geographical maps, aerial and satellite photographs, land plot records, as well as various statistical and archival data. They should be able to link to landscape functions and

observable landscape features or policy delineations, because landscape functions are directly observable from the land cover or are defined by policy regulations (Willemen et al., 2008).

When mapping green infrastructure, it is necessary to address some questions to understand the context (TEP, 2007b), as shown in Table 3.3.5. Gathering data should take into account ease of availability. As Table 3.3.6 shows, physical (geographic), social and economic data is readily accessible.

(2) Identify indicators

It is useful to identify which indicators (datasets) can be used to measure the performance of green infrastructure. The assessment of green infrastructure relates to the resource context, such as the quality, quantity and distribution of existing green spaces. The selected indicators should reflect the objectives of landscape policy, such as healthy lifestyles, environmental corridors, access to natural green space (TEP, 2007b). Hence, the following characteristics could be used to understand the data sources:

- a) Deficit of existing green infrastructure in the studied area (quality and quantity)
- b) Population density at different green spaces (density and overlay with green spaces)
- c) Assessment of green infrastructure (measurable standards)

Table 3.3.5: As aspects of green infrastructure considered for mapping (Adapted from: TEP, 2007b)
(1) Population distribution and density
(2) Demography - particularly population age structure, ethnicity
(3) Landscape characters
(4) Existing distribution of green space
(5) Key geographical features such as cities, market towns, rivers, communication networks
(6) Deprivation – using Index of Deprivation and its constituent parts (income, employment, health, crime)

Data sources	Social data	Economic data	Physical data
Master maps	-	-	Y
Demographic data	Y	-	-
Land cover data	Y	-	Y
Community health Profiles	Limited	Limited	-
Water and Air data	Limited	-	Limited
Natural disaster statistics	Y	Y	Y
Office for National Statistics	Y	Y	Y

(3) Identify data sources

Based on the aspects of the dataset in Table 3.3.6, various methods of data collection have been considered to find out the potential data (Table 3.3.7). These data contained various types of sources that were collected from online sources, public sections and other public groups (like Table 3.3.7 contained).

Data collection method	Sources from:
Online collection	- Specific public website with permission - Public website
Collection from official department and public resources (like library)	- Local Government Department - Library - Public statistic reports - Other public groups
Field survey	- Photos - Street View via Google Map

(1). Internet collection: this is a key way to collect data from public databases (website).

Online collection is one way to collect necessary data in this research, particularly from public databases. Large public resources can be accessed through the internet. In Sheffield, most of the background information is available to the public and can be accessed from Sheffield City Council's website. Also, related digital data can be collected from the Digimap website via the

University of Sheffield (<http://digimap.edina.ac.uk/main/index.jsp?useJS=true>). Moreover, some national survey websites supply large data like demography, social activity data and the economic data. For example, DEFRA/naei.org.uk, <http://casweb.mimas.ac.uk>, <http://borders.edina.ac.uk> and Natural England website contain relevant statistics.

(2). Collect from local public office, department and libraries, etc.

This is another way to obtain the necessary data and gain permission at the same time. For example, in Yuci in China, there is very limited opportunity to collect all the data through public websites. However, one can obtain information from local departments with permission, such as maps, demography data and related plans. Some related policy documents have been published for the public and can be found in public libraries or bookshops.

(3). Field survey

For understanding landscape features and functions at sites and obtaining visual information, field survey is important. In both cities, field survey was considered in the overall research process. Visual data is used to illustrate aesthetic function. However, it is impossible to visit all sites in the whole city so site visits were supplemented by Street View via Google Map.

Step 2: Data Manipulation

(1) Selecting data and matching identified indicators

Data manipulation is necessary to ensure that data assessment and integration occurs in the mapping process. Building the database requires digitisation and bringing thematic maps into the same format (Lioubimtseva and Defourny, 1999). The symbol-based information in maps can be digitally stored as a powerful database with thematic layers and attribute tables (Gustavsson et al., 2006). It includes a series of elements to present physical landscape conditions in the study area.

Through the above procedure, potential data sources can supply the indicators of green infrastructure (Table 3.3.8).

Potential Data sources		Sheffield	Yuci	Description	
		Y/N	Y/N		
Physical data	01	OS Maps/Master Maps	Y	Y	As a base map, it should have boundary and landscape form
	02	Land use boundary with name	Y	Y	Traditional land use in selected area
	03	Land cover data	Y	Y	Type of land use for master map
	04	Transportation	Y	Y	Road, railway, path and public assess
	05	Geological and drainage features	Y	Y	Water way, river corridors etc
Social survey data	06	Historical resources	Y	Y	Historical information
	07	Health data	Y	Limited	Health metrics linked to urban green space location
	08	Housing development in localities	Limited	Limited	Housing land Housing market price (related to urban green space cover)
	09	Education statistics	Y	Y	School, Education base
Demographic data	10	Economic statistics			Annual financial reports from local authorities
	11	Population data in localities			Recent population statistics in study area
	12	Age structure in localities			Age groups in study area

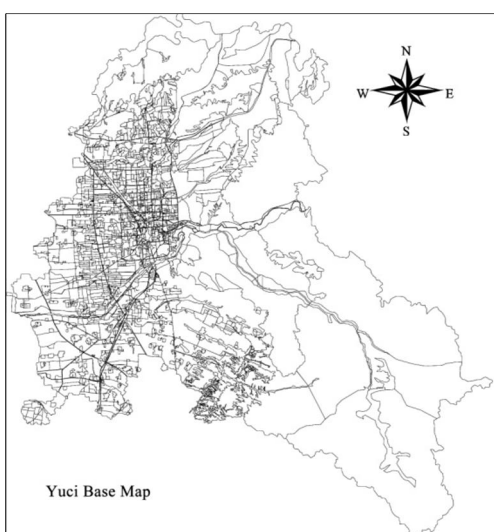
(2) Existing accessible green infrastructure resources

Green infrastructure mapping reflects types of green infrastructure and determines the green infrastructure resource in study areas. Based on the typology of green infrastructure (identified in Chapter Two), this step checks the datasets that are needed to match types of green

infrastructure features and to analyse the existing green infrastructure resource. Mapping the information includes the scale, context and character of the existing green infrastructure resources. For example, typology mapping, such as mapping parks and gardens, should include urban parks, Country and Regional Parks, and formal gardens in the selected study areas.

GIS maps show the role of landscape elements with specific functions in study areas (Hawkins and Selman, 2002). In this situation, a series of data for comparing existing conditions in urban green spaces have been transferred to fit GIS software (Lioubimtseva and Defourny, 1999) and to display the existing conditions within green infrastructure. This primary data is necessary for green space classification criteria.

Before mapping green infrastructure conditions, baseline maps have to be prepared. This is necessary to compare different options in the same area (Bender, 2005). Large scale mapping includes all current green plots in the study area. The creation of the digital data is entered onto a base map, then the corresponding map sheet divisions remain unchanged, so that all analogous map editions can be referenced in an identical manner (map 3.1 and 3.2) (Bender, 2005).



Map3.3.1: Base map of Yuci



Map3.3.2: Base map of Sheffield

(3) Mapping thresholds in green infrastructure

When assessing the mapped datasets, it may be necessary to consider thresholds of green infrastructure, such as percentage of land cover, and proportion of population with green space areas (TEP, 2007b). Some datasets may identify particular thresholds of need and are normally defined from national statistics and standards. For example, the Accessible Natural Greenspace Standard (ANGSt) set out in PPG17 (At least one hectare of local natural area per 1,000 population) (Town & Country Planning Association and The Wildlife Trusts, 2012). The Woodland Trust Woodland Access Standards set out that “*no person should live more than 500 meters from at least one area of accessible woodland of no less than 2 hectares in size*” (Town & Country Planning Association and The Wildlife Trusts, 2012, P17).

However, it is impossible that all green infrastructure indicators define absolute thresholds (Town & Country Planning Association and The Wildlife Trusts, 2012). Therefore, it should seek to match local, regional or national benchmarks to reflect the context of green infrastructure. For example, a threshold based on an average of 34% green cover has been set in China. A level under this percentage of green cover tends to indicate a poor greening level (MOHURD, 2010d), reflecting a deficit of green infrastructure in Chinese cities.

Step 3: Mapping and analysis

(1) Mapping current green infrastructure conditions

Green infrastructure components should be mapped based on the typologies previously identified. Hence, different types of green infrastructure can be mapped by GIS which bring the datasets together.

To determine existing green infrastructure, it is necessary to map spatial characteristics of the major human alterations to natural or semi-natural landscapes and to understand some of the general patterns of their interactions (Zhang et al., 2004). Maps of land use, policy interests

and investment can also be linked to real world practices via specific types of land use. It is therefore useful to understand the existing context and its potential development in the study area.

Mapping the existing green spaces illustrates the types of green space in the study area based on green space classification. Green space classification is fundamental to landscape management and research. It is driven by needs for practical solutions in landscape management and should be seen as one of many different information sets for assessing landscape (Brabyn, 2009). Therefore, the map of green space classification is important to understanding the landscape character and to assessing the management process.

(2) Mapping current evaluation

It is important that green infrastructure mapping includes more than mapping of green space classification. Thus, it needs data at different scales. Furthermore, to evaluate green infrastructure, mapping needs to identify indicators across the study region.

Distribution mapping displays the network of green spaces in the study area. It is used to identify the spatial nature of green infrastructure assets and opportunities based on identified datasets. It may include open spaces, public rights of way, cycle networks, biodiversity assets and heritage features (Natural England, 2009).

Further, potential development of green spaces is mapped to show the potential opportunities of green spaces by supporters (local government's proposal, policy supporting and development activities). It aims to display aspects of landscape development and helps to investigate gaps between current and desired future conditions.

To understand current management conditions, it is useful to illustrate the distribution of landscape management plans. This can show how many green spaces have been covered by specific management plans in the study area. In order to understand the state of management at

the city level, it is necessary to map the distribution of quality management citywide.

Step 4: Analysis and Consideration

Understanding the quality of green infrastructure is based on mapping considered to evaluate thresholds based on identified standards. For example, based on the Accessible Natural Greenpace Standard (ANGSt), buffer maps can show distance buffers around green spaces to identify accessible urban green spaces as advocated by PPG 17 and Green Flag criteria. According to these maps, accessibility issues could be investigated, for example, where centrally located, good quality open space and recreation facilities are provided as an integral part of new communities in order to make them attractive places to live (PPG 17 by DETR, 2001).

Step 5: Identify Goals and Proposals

Based on Step 4, this step analyses the potentials and gaps identified from maps. It enables the following evaluations:

- Types of green and open spaces in the mapped area with account, numbers
- Quantity of urban green spaces related to population density
- Distribution of urban green spaces related to health criteria for measuring relationship between urban green space and human activities
- Accessibility of urban green spaces to living spaces for measuring distance between urban green space and residential areas

3.3.4 Interview

It is important to gain feedback from practitioners to understand or test research purposes. There is a need to conduct a round of interviews. The method uses qualitative research

interviews that can reflect the researcher's concerns (Bryman, 2004). It embraces interviews of both the semi-structured and unstructured kind.

In this method, an interviewee may be interviewed on more than one occasion, in practice opportunities to get a better understanding of questions from interviewees. Initially the interview focuses on key group members within each city, as these participants have an important role in the management and planning process. Once these people have been identified as participants, they can be contacted to confirm availability and give permission to interview. However, before contact with interviewees, ethics approval has to be achieved. This was approved by the Department of Landscape Ethics Review Committee on behalf of The University of Sheffield.

Before interviews are conducted, the interviewer should become fully conversant with the interview guidance. The guide includes a certain amount of detail on the research area and formal interview questions. It should contain general information (name, age, gender) and specific questions (such as job title, role in process, number of years involved in a group), to make it more useful for contextualising respondents answers (Bryman, 2004).

The interview schedule introduction requires the research to help interviewees understand the research purpose and utility (or research background). Second, a series of questions is prepared avoiding long and double-barrelled questions (Robson, 2002). It is more common to use open-ended question in interviews.

Interview setting

In order to understand and determine how practitioners implement and measure management of green spaces in practice, this research sought to interview selected practitioners who are working in the landscape departments in selected case study cities. Two interviews were conducted in Sheffield's Parks & Countryside Service at Sheffield (UK) and in the Landscape Department at the Yuci (China)

The interviews were conducted on a one-to-one basis (except one which included two interviewees). The interviews were organised at a time convenient to interviewees, and last between 45 and 60 minutes. Interviewees received a summary of the findings once the research was completed for checking.

Interviewee selection

The purpose of interview was to explore how practitioners perceived landscape management in their city. Therefore, the participants are chosen from local department/authorities in Sheffield and Yuci, who were working in key positions and had first-hand knowledge of landscape management and monitoring.

Interview Questions

The interviews were organised with a series of questions to determine understanding and experiences in practice. The interview questions were divided into seven themes (see Appendix 2). Each theme had specific topics and aims to achieve specific understanding of landscape management from participants. An explanation sheet was also attached to explain the purpose of the interview questions (see Appendix 3).

Data protection

Before contact with the interviewee, ethics approval had been applied to gain permission from the Department of Landscape Ethics Review Committee on behalf of The University of Sheffield. Through this ethics approval procedure, the interviews had a set method to protect interviewees' information for avoiding ethics issues.

Once permission was gained from the interviewee, interview conversations were digitally recorded for checking after the interview. All data collected during the research is kept strictly

confidential.

3.4 Conclusion

The considered methods and the justification of their uses have been outlined in this chapter. It aimed to impart an understanding of why each method was selected and used. At different stages, in the development of this thesis, these necessary methods, as literature review, GIS mapping and interview were addressed to determine the research aims.

Literature review was combined with a wide range of data which addressed relevant concepts, understandings, meanings and functions of green infrastructure. The analysis of literature supported to improve understanding and developing principles of green infrastructure management. The literature review also enabled a framework of management to be proposed, learning the literature and discussions associated with landscape management. The collected data contained wide aspects of literature including academic, policy and practices, which are related to the research aims.

Further, a comparative case study has been used to investigate the management of multifunctionality for improvement of green infrastructure in various regions. This comparative case study is concentrated on explaining and comparing management practices in urban green spaces, and also addressed on particular landscape functions and management roles in different practices.

In order to determine and analyse context of green spaces in the study area, Geographical Information System (GIS) has been chosen to determine the green space contexts in these study areas. Using GIS technology to map at city level could help to identify the geographic coordinates of green spaces and linkages, and also provided evidence to analyse gaps and potential with management approaches. In this thesis, the GIS method has referenced from TEP and the North West Green Infrastructure Unit practices (Butlin et al., 2011; TEP, 2007b),

which provided five steps and is particularly useful for analysis of green infrastructure contexts in cities.

Interviews were used to test research purposes, for achieving feedback from practitioners, discussions of management of urban green spaces to be made. These were based on the themes from the literature, understanding of research and practices of landscape management. The focus of these interviews is intended to determine implementation, monitoring in practices with understanding from practitioners. These interviews have achieved Ethics Approval from the Department of Landscape in the University of Sheffield. The analysis of interview data contained in the discussion is presented in the following chapters (Chapter 6 and 7).

Chapter 4: Introducing the Case Study Areas

4.1 Introduction

This chapter describes the settings of the case study areas. It aims to provide an introduction to the physical, social and policy contexts in the selected cities. This chapter comprises two parts. The first explains how the cases were selected, and describes the general backgrounds for each city. The second part sets out the GIS data for each city.

4.2 Case study description

4.2.1 Urban selection

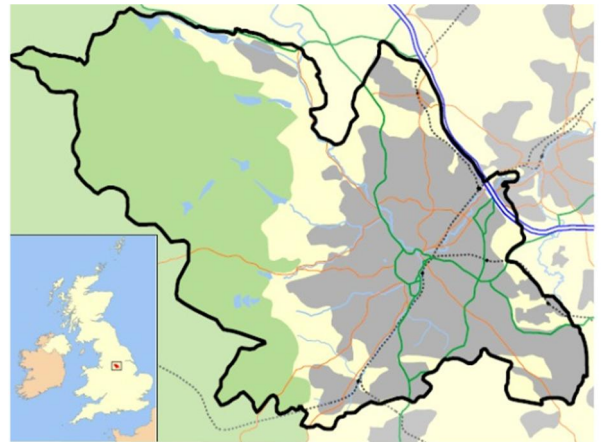
Chapter three described how the purpose of comparison studies was to investigate the actual and potential nature of multifunctionality in urban green spaces. Thus, two urban areas in different regions (China & UK) with their urban green spaces are considered as objects of comparative study to explore their characteristics and appreciate the opportunities to knowledge exchange in planning and management for landscape multifunctionality.

The basis of case study selection was identifying cities of medium scale with these common points:

- They should both be ‘medium scale cities’ with similar level of population.
- They should have similar landscape background (or historical context)
- They should have different cultural backgrounds, as it is important for the research to produce conclusions which recognise the influence of differing cultures.

Selected city in UK: Sheffield, Yorkshire

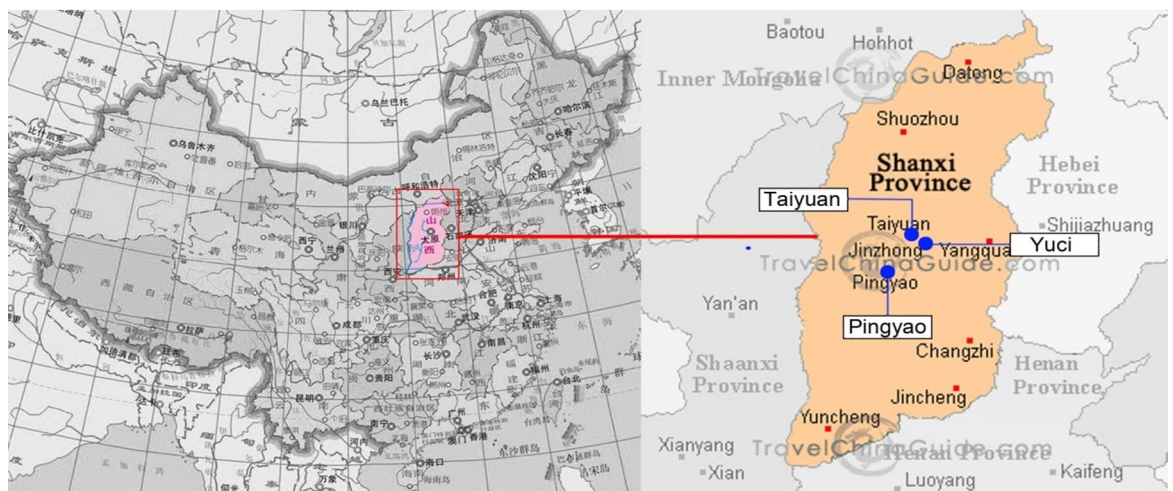
Sheffield was selected (Map 4.2.1) because it is the greenest city in England (Sheffield City Council, 2011a) and displays a wide range of landscape management practices. The city of Sheffield has a range of urban green spaces which are well managed by the local authority.



Map 4.2.1: Location Map of Sheffield
(Sources from: Beer, 2003 [online])

Selected city in China: three optional cities

In China, the following cities were considered for use in the case study. The three cities which were considered are Taiyuan, Yuci and Pingyao in Shanxi Province in China (map 4.2.2). As table 4.2.1 shows, there is a general condition of three cities.



Three considered cities in China (Base Map from: <http://www.travelchinaguide.com>)

Map 4.2.2: Location of the three cities in in China

Source from: www.travelchinaguide.com

Context	Taiyuan	Yuci	Pingyao
Population	4.2 million whole area	630,000	493,115
	3,212,500 in urban area		
Size	6959 km ² whole area	1,327 km ²	1,260 km ²
	1,460 km ² urban area		
General Context	<ul style="list-style-type: none"> ● A prefecture-level city ● The capital of Shanxi province, China ● One of China's heavy industrial cities and account for more than half the national coal mining output. ● a wealth of tourist attractions ● National historical city 	<ul style="list-style-type: none"> ● 25 km distance to Taiyuan ● Yuci is one district in Jinzhong (Jinzhong was created in 1999 by amalgamating the city of Yuci and Jinzhong prefecture, with the former. Pingyao also is a district in Jinzhong) ● National historical city in China ● An industry city (coal industry, medical industry, foundry industry etc) 	<ul style="list-style-type: none"> ● 80 kilometres (50 mi) from the provincial capital, Taiyuan. ● A medium size city in Shanxi province ● An ancient urban & a UNESCO World Heritage Site ● Small town center without open green spaces

Table 4.2.1: General characteristics of three alternative cities in China
(Sources from: Pingyao Travel Web, 2013; Travel China Guide, 2010; Yuci Local Government, 2011, online)

Option 1: Taiyuan in Shanxi in China

Taiyuan is a prefecture-level city and the capital of Shanxi province in China. It also is the political, economic and cultural centre of Shanxi (China Academy of Urban Planning & Design, 2008). In 2010, the city had a population of 4.2 million.

Taiyuan is a city bounded on three sides by mountains. It has a long history and in ancient times was an important military town. At present, Taiyuan is one of China's heavy industrial cities and accounts for more than half the national coal mining output.

Taiyuan also has a wealth of tourist attractions, most notably the Jinci Temple. This is the city's most attractive temple although the Shuangta Si (Twin-Pagoda Temple) has become a symbol of Taiyuan on account of its unique architecture. Another major attraction is the Tian long Shan Stone Caves where magnificent sculptures dating from the Tang Dynasty (618-907) may be seen.

Also, Taiyuan benefits from convenient public transport systems as the city is the provincial transportation hub (Travel China Guide, 2010, online). In the city region, there are many different parks which include urban parks, historical gardens, forest parks and other types of green space (Figure 4.2.1).

Option 2: Yuci in Shanxi in China

Yuci District, one district in Jinzhong city, lies in the central part of Jinzhong Basin, next to Taiyuan on the northwest. It is the political, cultural and economic centre of Jinzhong. It is a medium-scale city and the whole region totals 1311 km². The population of Yuci District is 630, 000 in 2010.

Yuci urban area is situated on the Xiaohe River and 25 km distance to Taiyuan. It is a National Historical City and also is a developing industry city which includes coal industry, medical industry, foundry industry etc.

Moreover, the local government of Yuci has recently aimed to develop the city as a garden city and promote many greening projects and new park developments.

Option 3: Pingyao in Shanxi in China

Pingyao is a traditional Chinese city and county in central Shanxi province, China. It lies about 715 km from Beijing and 90 km from the provincial capital, Taiyuan. During the Qing Dynasty, Pingyao was a financial centre of China. It is now renowned for its well-preserved ancient city wall, and is a UNESCO World Heritage Site.

It is located on the eastern banks of the Fen River, and is in the south-western edge of the Taiyuan basin. It is adjacent to another Chinese Historic and Cultural City Qi County. Pingyao's economy is largely agricultural and the region is famed for its beef. Other products from the region include grains, cotton, and lacquer ware.

Final selection

Finally, according to comparison of these cities, Yuci was selected as the study area in China, because it has much new development of urban green spaces and management processes and also has several common points with Sheffield:

1. They are both 'medium scale cities' with similar populations.
2. They were both industrial cities with iron and steel industry in the past decades, and have a similar landscape background.
3. There are different cultural backgrounds in these two cities.
4. In Sheffield, management plans for parks and open spaces have been produced. It also produced the Green and Open Spaces Strategy to promote quality of landscape management.
5. In Yuci in China, only the central urban area green and open space is managed according to a maintenance plan. Compared with Sheffield, this is an opportunity for knowledge exchange of actual current best practices.



Figure 4.2.1: General condition of Taiyuan in Shanxi in China

(Sources: Map 1 from internet; Map 2, 3 from Taiyuan Master Plan 2008; Photos from author)

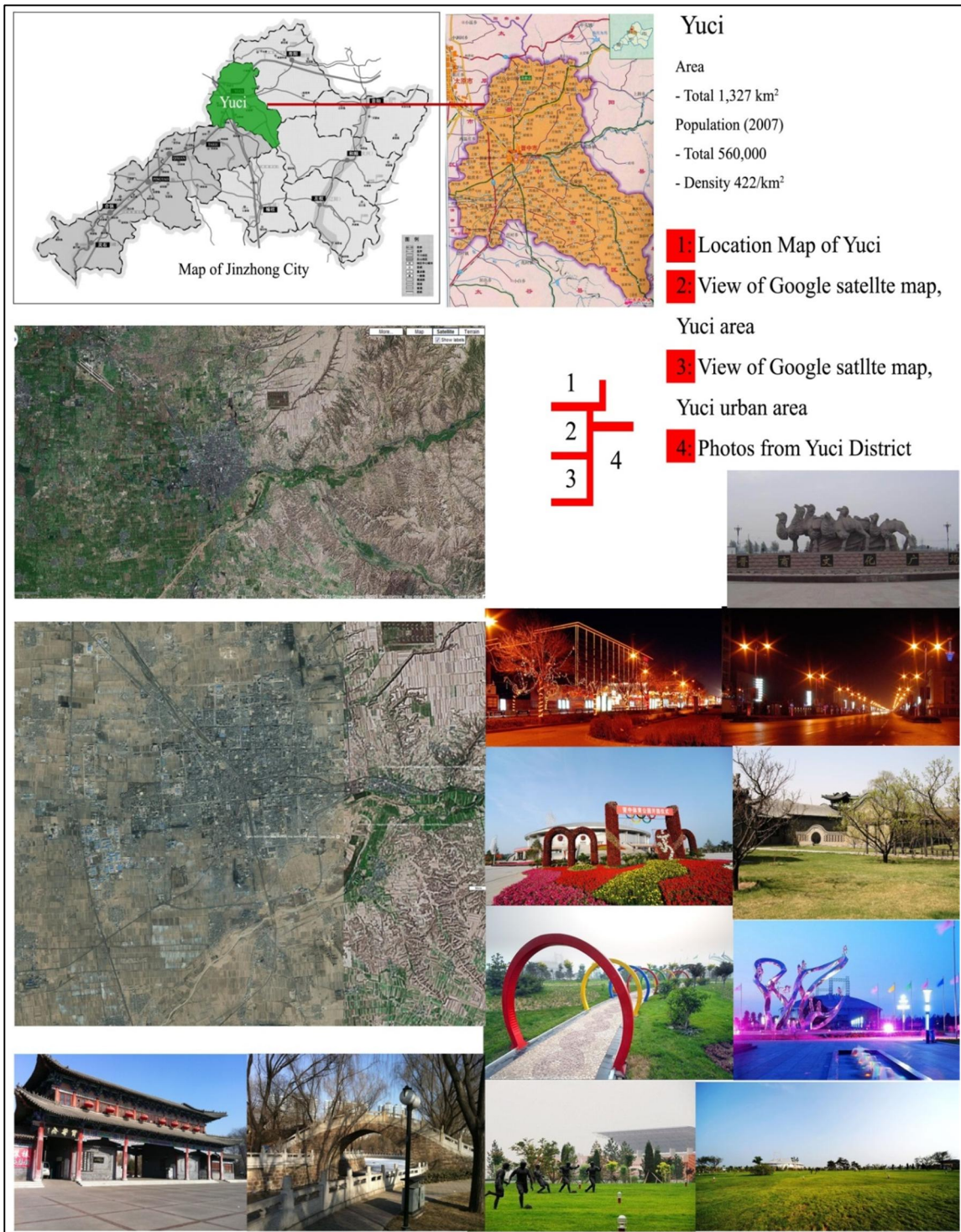


Figure 4.2.2: General condition of Yuci in Shanxi in China

(Sources: Map 1 base map from internet; Map 2, 3 from Google map; Photos from <http://www.sxjz.gov.cn/sites/ylj/index.jsp>)

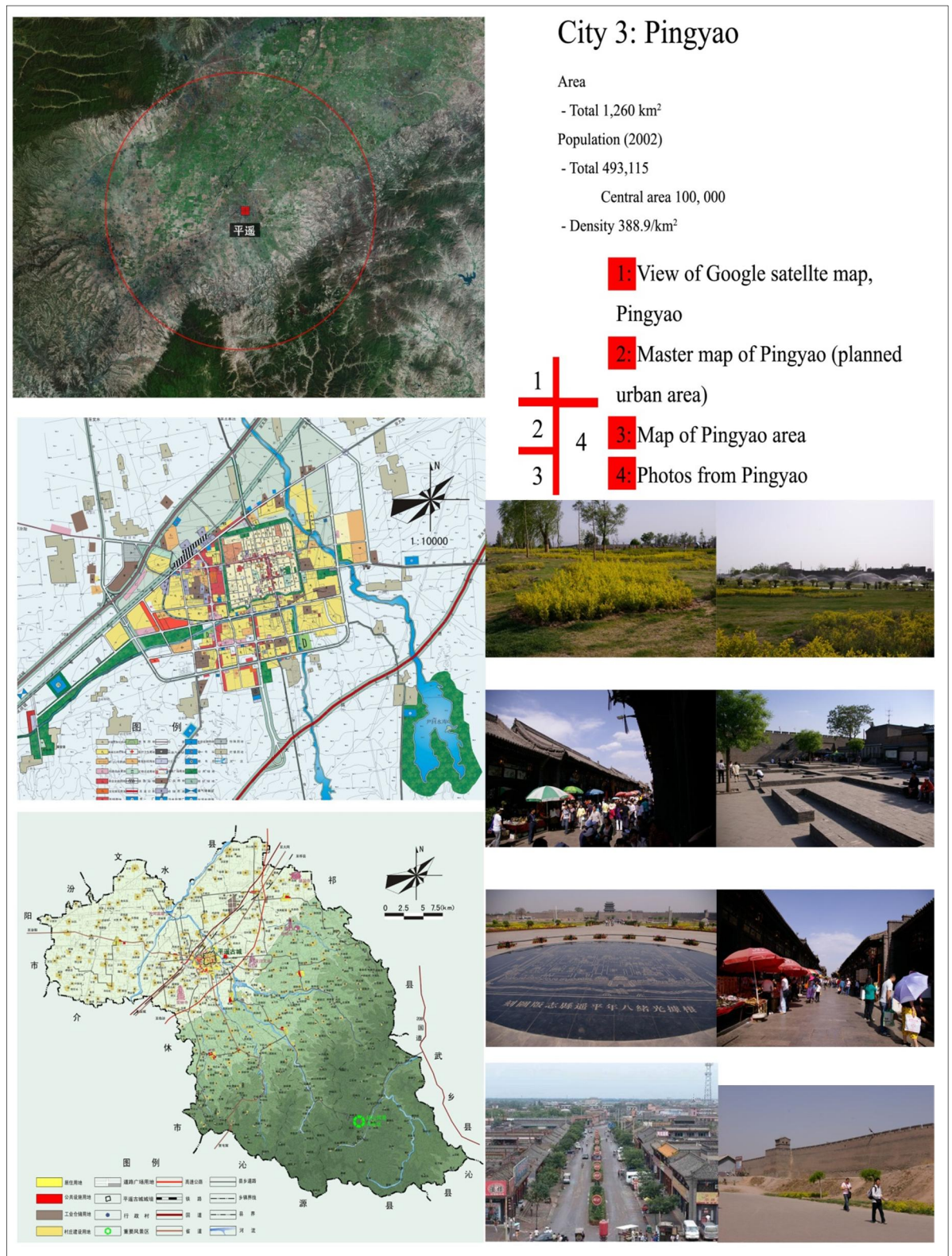


Figure 4.2.3: General condition of Pingyao in Shanxi in China

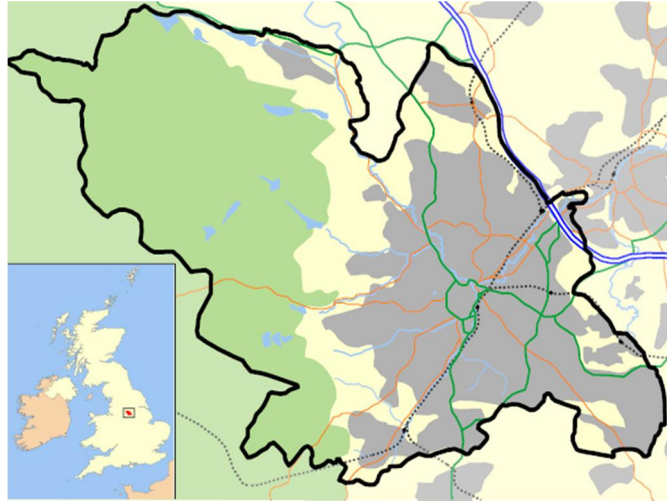
(Sources: Map 1 from Google map; Map 2 from Pingyao Master Plan 2000; Map 3 from Pingyao urban system plan 2009, Photos from <http://www.pyonline.net/>)

4.2.2 Urban description (urban context)

Sheffield Context

Location and Background

The city of Sheffield is located in South Yorkshire in England. It is the fifth largest municipality in the UK and the ninth largest urban area. This city was an industrial city with steel industry and obtained a world-wide recognition during the 19th century. (Sheffield City Council, 2011a)

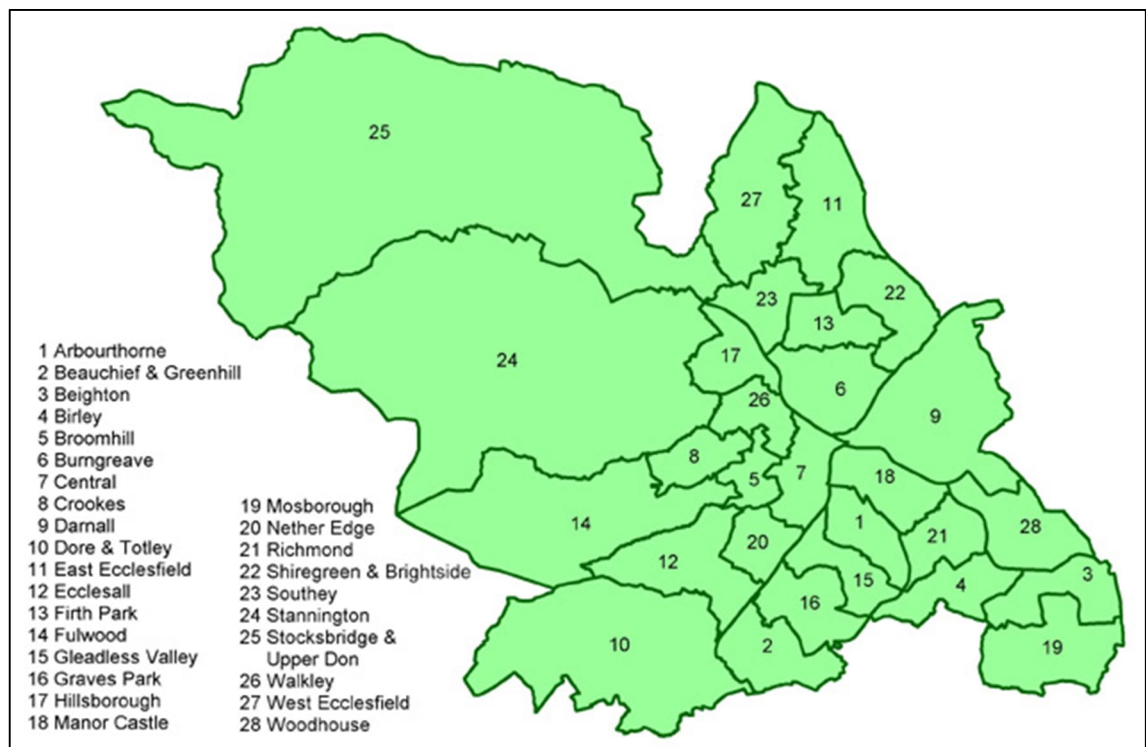


Map 4.2.4: Location Map of Sheffield
(Sources from: Beer, 2003 [online])

Sheffield is located in the metropolitan county of South Yorkshire. To its west is Rotherham which is separated by the M1 motorway. On its northern border is Barnsley Metropolitan Borough and to the south and west is the county of Derbyshire. Sheffield's area is 368 km². It includes substantial areas of the Peak District National Park and farmland where the density of buildings is very low (Davies et al., 2008).

Sheffield is governed at the local level by Sheffield City Council. It has 28 wards (as map 4.2.5 shows). The population of Sheffield in 2011 is 551, 800, one of the eight largest regional English cities (Sheffield City Council, 2011a).

“Sheffield is geographically very diverse. The urban area nestles in a natural bowl created by seven hills and the confluence of five rivers: the Don, Sheaf, Rivelin, Loxley and Porter. Much of the city is built on these hillsides, with views into the city centre or out to open countryside. The city's lowest point is just 10 metres (33 feet) above sea level, whilst some parts of the city are at over 500 metres (1,640 feet) above sea level” (Sheffield City Council, 2011a, online).



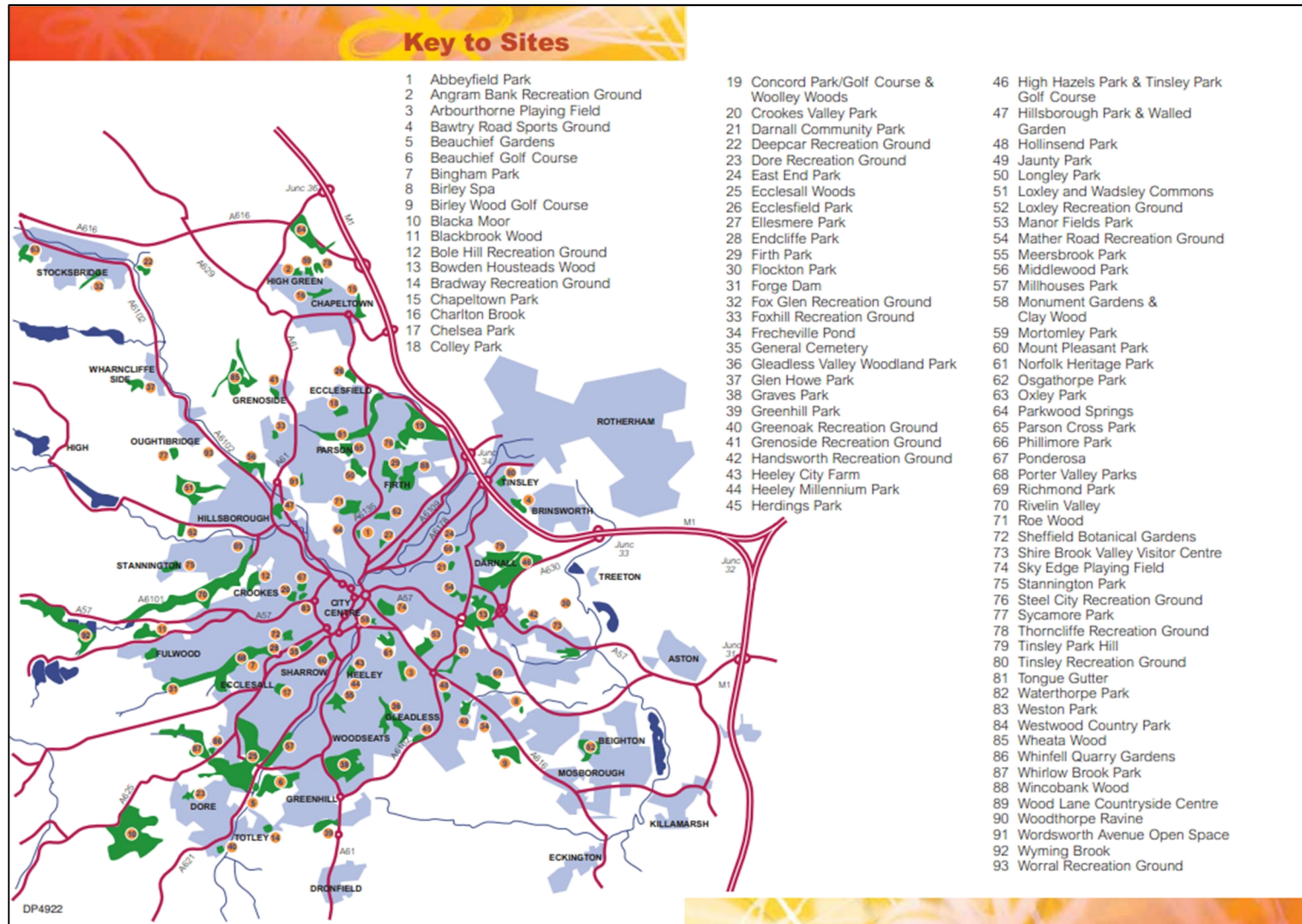
Map 4.2.5: Map of Sheffield Wards

(Sources from: https://eduplugins.sheffield.gov.uk/schools/media/sheffield_wards.jpg)

Green Spaces in Sheffield

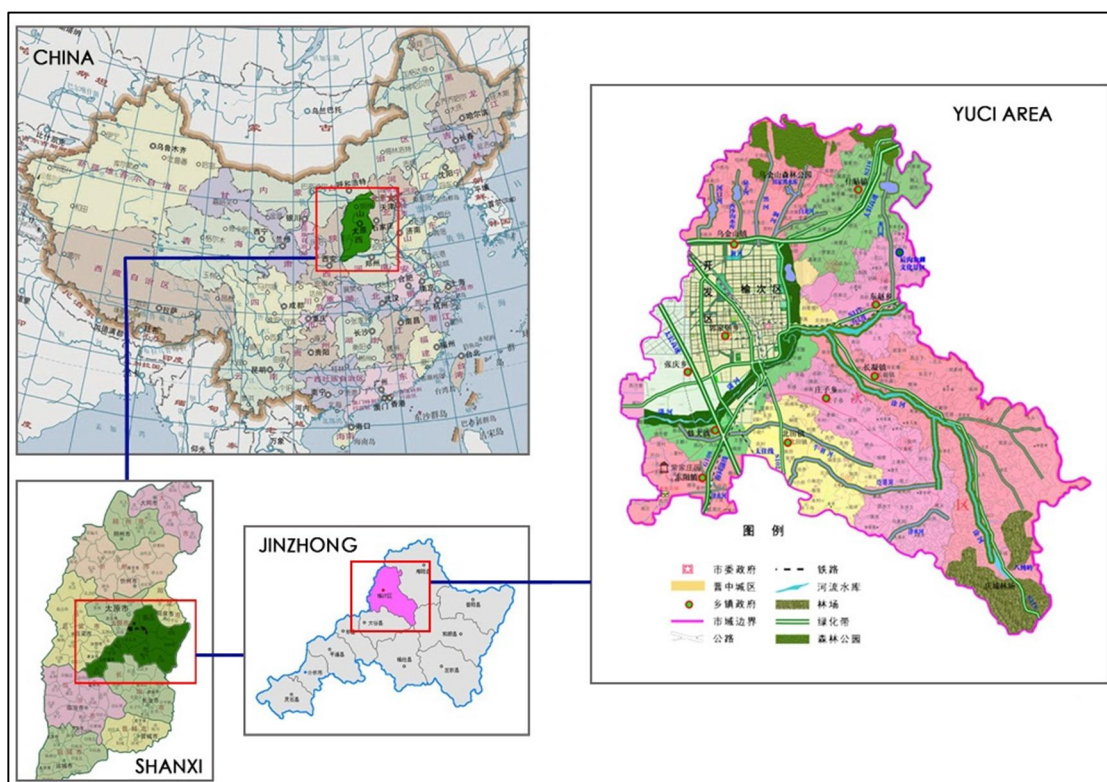
Sheffield contains the most varied landscapes to be found in any city in the UK. These landscapes range from the dense urban centre, through the built-up housing and industrial areas of the City to its hills, lakes (dams) and moorlands (Beer, 2003).

As the greenest city in England, it has over 170 woodlands, 78 public parks and 10 public gardens (map 4.2.6) (Sheffield City Council, 2011a). Moreover, it is the only city in England to include part of a national park and almost 11 km² of water, resulting in 61 percent of the comprising green space. The Peak District National Park, the first national park in England is located on the Southwest of Sheffield. Further, Sheffield City Council announced plans to promote a new chain of parks for a new generation in 2010.



Map 4.2.6: Parks & Green Space Maps in Sheffield (source from: Sheffield City Council [online]
<https://www.sheffield.gov.uk/out--about/parks-woodlands--countryside/parks/maps.html>)

Yuci Context



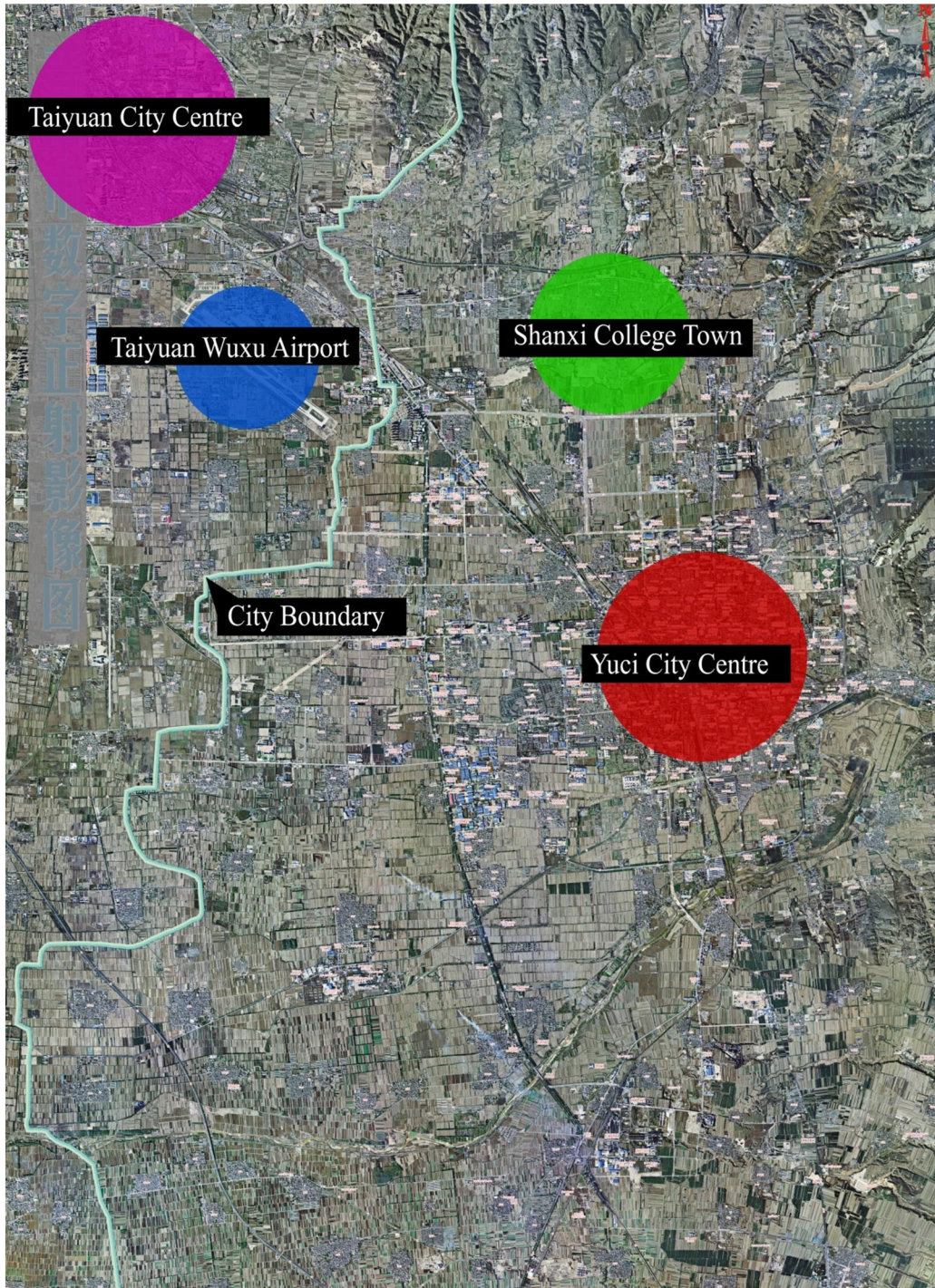
Map 4.2.7: Location of Yuci (Source from: Jinzhong Green System Plan 2009)

Location and Background

Yuci is a medium city in central Shanxi province, northeast-central China. As Map 4.2.7 shows it is situated on the Xiao River, about 25 km south of Taiyuan, the provincial capital. Now, it is one district in Jinzhong city. Jinzhong was created in 1999 by amalgamating the city of Yuci and Jinzhong prefecture, with the former becoming a district under the new city.

In the past, the textile industry was the economic mainstay in Yuci which is surrounded by cotton fields. Because of the expansion of industry, Yuci became a communication Centre in 1950. In the past twenty years, other major components of the local economy in Yuci also include coal mining and coking, the processing of agricultural products, and the manufacture of metallurgical products, chemicals, and building materials. Since 2009, Shanxi Province government has aimed to develop cultural and educational businesses. In 2010, a new College

Town called Shanxi College Town (or the Higher Education Centre), has being developed and is located between Taiyuan and Yuci. The Shanxi College Town includes more than ten colleges (or universities) which are totally new campuses (as Map 4.2.8 shows) and is planning to develop the population to more than 115,100.



Map 4.2.8: Relationship between Shanxi College Town and Yuci City Centre

(Base map from: Jinzhong Local Government, Yuci)

Green Spaces and Green Infrastructure

Yuci as the central district in Jinzhong city has many green space policies and practices. In 2008, it had 8.5m² green spaces per person and its rate of green space was 30.48% and rate of coverage green spaces was 35.33%. This reflects three measures that are commonly used in Chinese municipalities: rate of green space per person (area/population); rate of green space, or the greening rate (green area/area); and rate of green space coverage (vertical green covered area/total land area).

In Yuci's urban area, parks and urban green spaces total over 297 ha and includes 8 parks, 3 squares and many other types of green spaces, for example, Yuhu Park, Jinzhong Sports Park, Tianhu Green Garden, Jinwei Park, Ancient City Park (Appendix 4). Additionally, there are productive green spaces around the central urban area which total 113.3 ha. (Zhong Xi Chang Nursery is 33.34 ha; Wang Cun Nursery is 6.67 ha; Jinzhong Nursery is 33.34 ha; Railway Nursery 20 ha; Shi Zhao Nursery is 13.34 ha; and Yuci District Nursery is 6.67 ha.).

Moreover, this city has some attached green spaces which exist in residential, industrial and transport areas. In Yuci countryside, there is also Wujin National Forest Park and Ba Fu Ling Provincial Nature Reserve. These two areas total 189.34 km².

In 2009, the Jinzhong local government produced the Jinzhong Green System Plan which promotes a series of actions to improve the quantity of green spaces in Yuci urban area. However, the local authorities are not using the notion of green infrastructure to guide, plan and manage green spaces at the large scale. However, they prefer to adapt a Green System Plan and use the idea of ecological systems to manage green spaces in the ex-urban area, such as agricultural land in the countryside.

4.3 GIS mapping

4.3.1 Data collection and datasets

This part describes what kinds of data have been collected for GIS mapping. According to the steps set out in Chapter Three, deskwork has been undertaken before data collection. It is based on research questions and availability of data from the study areas (Appendix 5). Evaluated data has been listed and collected from both cities. In Sheffield, most data is available on public websites, for example, digital maps (land use maps) have been downloaded from the Digimap website via the University of Sheffield.

However, in Yuci, all data is public data and is supplied by local departments. This data is not all available online. Some data is collected from bookshops and local departments. In this case, the data is massive and has to be reorganised to suit mapping for the research.

The list of collected data has been classified for further research. For example, there is data on baseline maps, data on demography and data on transport, parks and green spaces. Appendix 6 and 7 are the final original data collected which has been integrated in the mapping stage. Based on the research aims, these data are integrated into different types to fit GIS queries. The database therefore is used to explore maps for determining context of green infrastructure in Chapter 5.

4.3.2 Urban green spaces mapping

- **Urban green space classification**

The classification of landscape is complicated by the fact that it involves many perceptions and physical realities (Brabyn, 2009). Therefore, before mapping urban green spaces in each city, a typology of green space has been considered. It is based on the typology in PPG 17 and it also considered the national green space classification standards in China. The urban green

space classification shown in Table 2.2.4 has therefore been used.

The standard typology promotes nine broad types of green and open space according to which green spaces have been mapped (Table 4.3.1).

Code	GS Typology
GS 01	Park and gardens
GS 02	Provision for children and teenagers
GS 03	Outdoor sports facilities (with natural or artificial surfaces)
GS 04	Amenity green space
GS 05	Allotments, community gardens and urban farms
GS 06	Cemeteries and Religion
GS 07	Natural and semi-natural urban green spaces, including woodland or urban forestry, agricultural land
GS 08	Green corridors
GS 09	Civic Spaces
Table 4.3.1: Types of urban green space Adapted from PPG 17	

- **Traditional land use Categories**

The land use map is a way of showing the categories of land in the study areas. According to the analysis of distribution of land use, potential opportunities can be investigated to determine the relationship between green spaces and other land uses in the selected areas (Table 4.3.2).

The research has used a land use typology used by Sheffield City Council, because this typology adequately reflects different land uses. It was also considered for use in Yuci's land use map. However, agricultural land forms a high proportion in Yuci and this land use classification does not give much detail. However, on this modified category for use in both cities (Table 4.3.2). Here, unenclosed and enclosed lands mean unimproved or improved land for respectively agricultural use.

Table 4.3.2: Land use classification (Adapted from: DCLG, 2005; Land Use Consultants, 2003; MOHURD, 2011)		
Code	Typology of Land use	
LU01	Commercial Land	
LU02	Communications	
LU03	Enclosed Land	Including agricultural land
LU04	Horticulture	
LU05	Industrial Land	
LU06	Institutional Land	
LU07	Ornamental, Parkland and Recreational Land	
LU08	Residential Land	
LU09	Unenclosed Land	Including agricultural land
LU10	Water Bodies	
LU11	Woodland	

4.4 Summary

Generally, this chapter explained how these comparative cities were chosen. Through these explanations for city chosen, these two cities, Sheffield (UK) and Yuci (China) became the comparative case cities in this study. The general backgrounds of Sheffield and Yuci have been introduced to provide a glance for understanding the general city context in both cities. Both of the two cities have developed their green space from an industrial development background with a series of environment and social issues. More details will be analysed in Chapter 5.

As described in Chapter 3, GIS mapping has considered a series of possible data for map. This chapter provided a general introduction for setting out the selected database for mapping the context of green spaces in Sheffield and Yuci. Besides, the previous section has explained what data has been collected and classified, and what urban green space typology and classification have been chosen for mapping. The specific analysis and results of GIS mapping will be explored in the following chapters.

Chapter 5: Establishing the Green Infrastructure Context of the Two Cities

5.1 Introduction

Following the case studies set out in Chapter Four, the selected cities have been mapped to determine their green infrastructure context. In this respect, this chapter aims to study the extent and nature of green infrastructure in the cities and to recognise that it can be managed and monitored for multifunctionality.

In order to recognise the context and benefits of existing green infrastructure, this chapter first reports on GIS maps as essential sources to show the context of various green and open spaces which are accessible to people. At the same time, the quality and variety of specific types of open spaces are analysed to investigate the multifunctional potential based on GIS maps and management context.

Also, this chapter considers management and monitoring arrangements in each city. The structure of landscape management in local authorities in each city will be studied separately to explain the relationship between local structures, policies and management practices.

Moreover, this part also queries the phases of landscape management practiced in the local authorities. This is an important stage to investigate the potential opportunities for improving quality of landscape management, and instigating comparison between these two cities. Overall, this chapter studies the current context of green infrastructure, its physical condition and the management situations in each case.

5.2 Existing Green Infrastructure in Sheffield (UK)

This section determines the existing green infrastructure in Sheffield. It includes an understanding of existing green spaces and an analysis of management structure and context of green spaces in Sheffield. It attempts to identify where green spaces are managed by local authorities and what kind of action is potentially needed to improve their management and pay more attention.

The following part determines the current context of green infrastructure in Sheffield through GIS analysis. It sets out a baseline and provides a framework for investigating issues in the city. This section also focuses on the implementation of the management plan, policies on urban green spaces in Sheffield. It recognises the existing management structure in Sheffield and methods for monitoring progress. Thus, it needs to show how implementation is accessed to ensure attainment of policies and plans. Here, the analysis of management and measure is mainly studied through departmental management structures, and in written policy documents and management plans.

5.2.1 Green infrastructure context in Sheffield

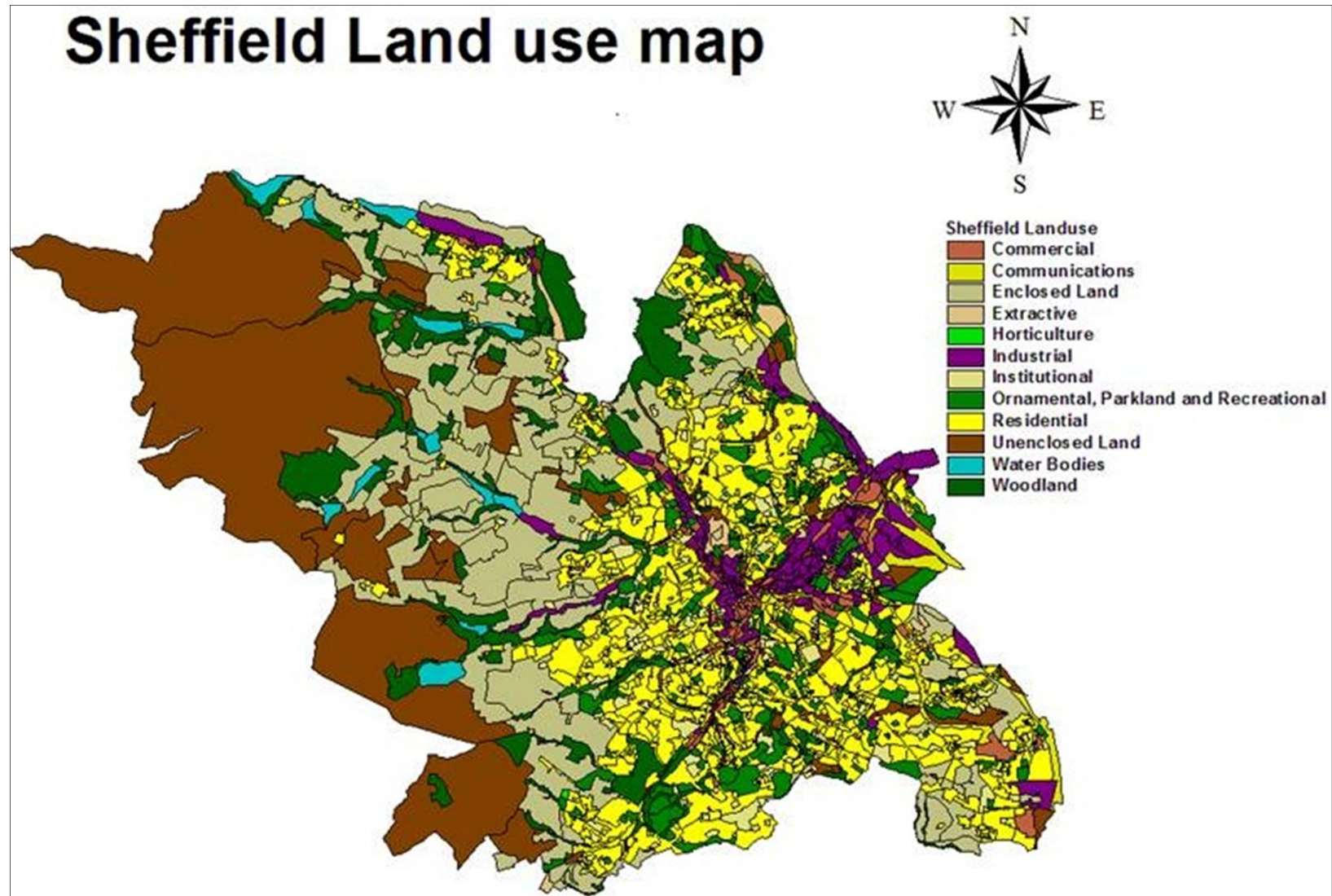
5.2.1.1 Establishing the Green Infrastructure Baseline Map

First, a land use map has been based on the OS Master Map to show different land uses in Sheffield. OS Master Map is an intelligent digital map designed by the Ordnance Survey and using a geographical information system (GIS) and UK databases (Davies et al., 2006).

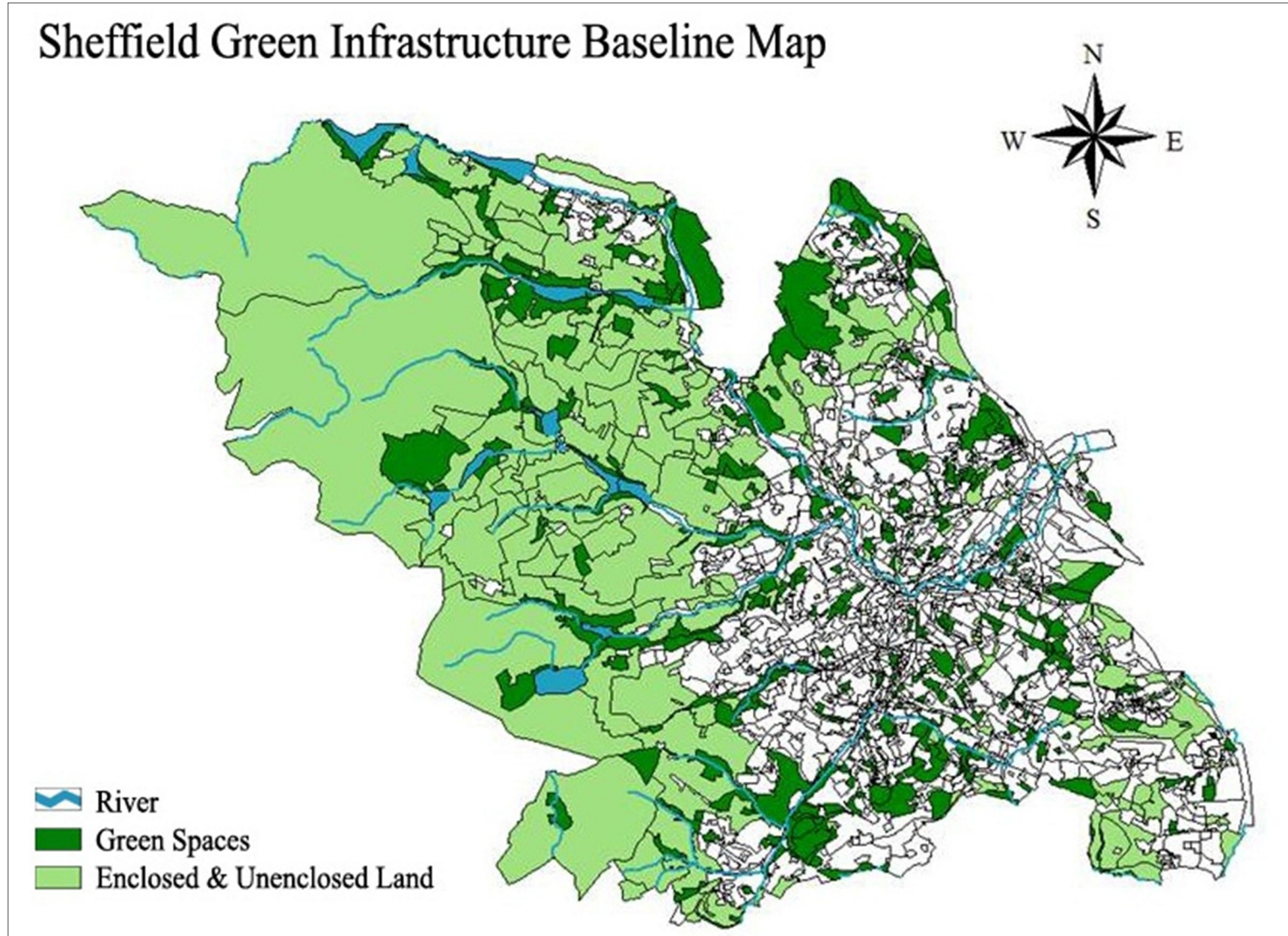
As Map 5.2.1 shows, most of the residential areas are close to the central area in which enclosed and unenclosed lands surround the urban area in Sheffield. Industrial lands are mainly located in the east of Sheffield. Most natural, semi-natural areas are located in northwest Sheffield, such as the Peak District and Agricultural Land (including enclosed and unenclosed land).

Although the land use map could have been used directly to show the distribution of land use, it includes too much additional information which may not be needed for mapping green or open spaces. Therefore, a green infrastructure baseline map was produced to extract all green typology from the land use map. It selected only features of land use for mapping which are relevant to the green infrastructure typology.

The baseline map was also used to understand the local context between built up areas and green spaces. Thus, the analysis of local context is understood across the city region in Sheffield. The baseline map established the context for current green spaces, including geographical and demographic contexts (Map 5.2.2).



Map 5.2.1: Sheffield Land Use Map



Map 5.2.2: Sheffield Green Infrastructure Baseline Map

5.2.1.2 Mapping the context of green spaces

Typology of green infrastructure has been described in Chapter Two and Three. The chosen typology (Table 4.3.1) includes nine main types of green and open spaces which have been proposed for mapping of green spaces in Sheffield's Green and Open Space Strategy (Sheffield City Council, 2010a).

Map 5.2.3 presents the green space classification map which depicts a general context of urban green spaces. For example, green corridors follow with river corridors and streams from the main valleys to connect with the surrounding countryside and the city's rural hinterland. The Sheffield Development Framework (SDF) promotes a strategy to enhance the Green Corridors and Countryside as a green network. In Sheffield, most of the countryside will remain protected as Green Belt to support urban and rural objectives (Sheffield City Council, 2010b). They are linked by green corridors as a green network to bring more natural benefits and provide multiple services for people.

Moreover, this map also displays the nature and location of different types of urban green spaces in the city area. It can be seen that there is a large amount of natural and semi-natural areas around the built up urban area and existing countryside area. In Sheffield, the agricultural area is a major part of its green space and is highly valued by its inhabitants (Beer, 2005). As mentioned above, green corridors link these natural areas from the countryside to the urban area. At the same time, other types of urban green spaces are scattered throughout the remaining area. For example, it may be noted that the amount of outdoor sports facilities is the second largest which is higher than parks and gardens. Also, it can be seen that there is a shortage of children's playing fields. In summary, Figure 5.2.1 and Map 5.2.3 supply general information to show where and how many green spaces exist in Sheffield. However, it has to be pointed out that private gardens are not included in this analysis, even though they could provide many services.

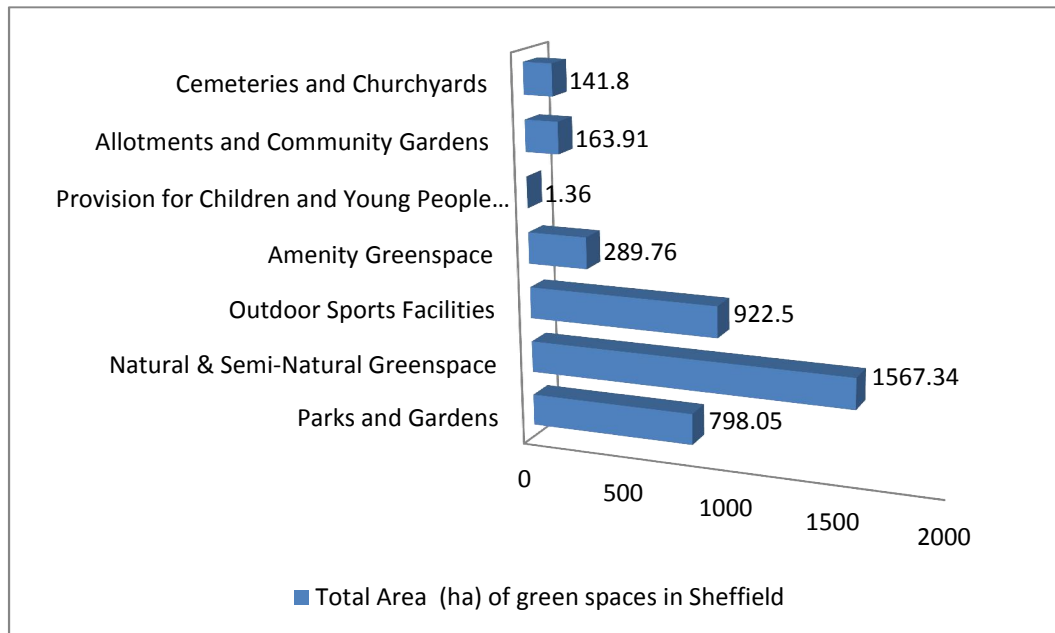
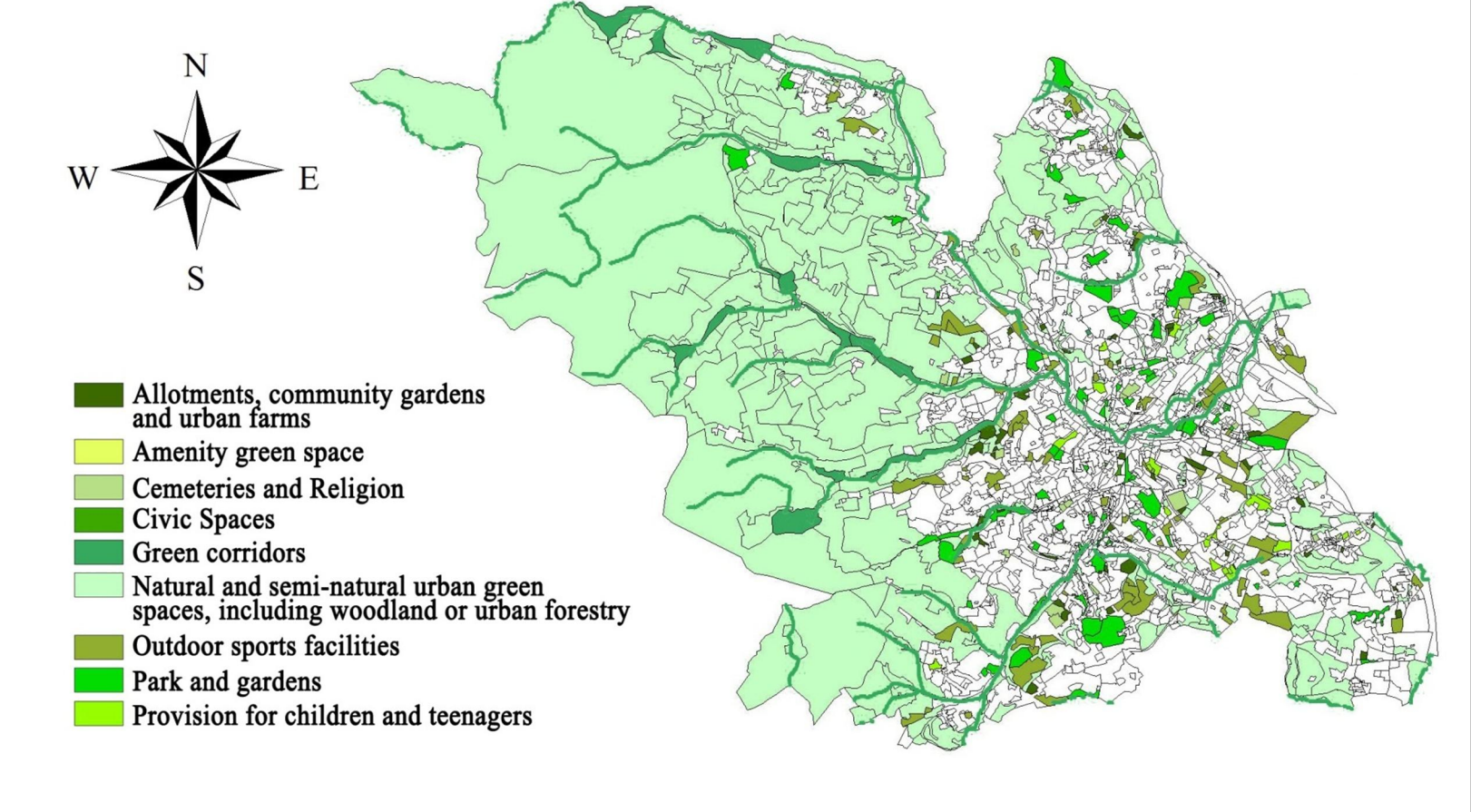


Figure 5.2.1: Account of different urban green spaces in Sheffield (without natural and semi-natural area) (Source:Sheffield City Council, 2008a)

Map of Green Space Classification in Sheffield



Map 5.2.3: Map of Green Spaces in Sheffield

5.2.1.3 Green infrastructure condition

“Typology mapping determines where the green infrastructure resources are in the study area and what type of green infrastructure the resource is” (Butlin et al., 2011, P.7). The typology of green infrastructure was discussed in Chapter 2 and 3. The following Table (Table 5.2.1) shows five main typologies of green infrastructure which have been used in the mapping process.

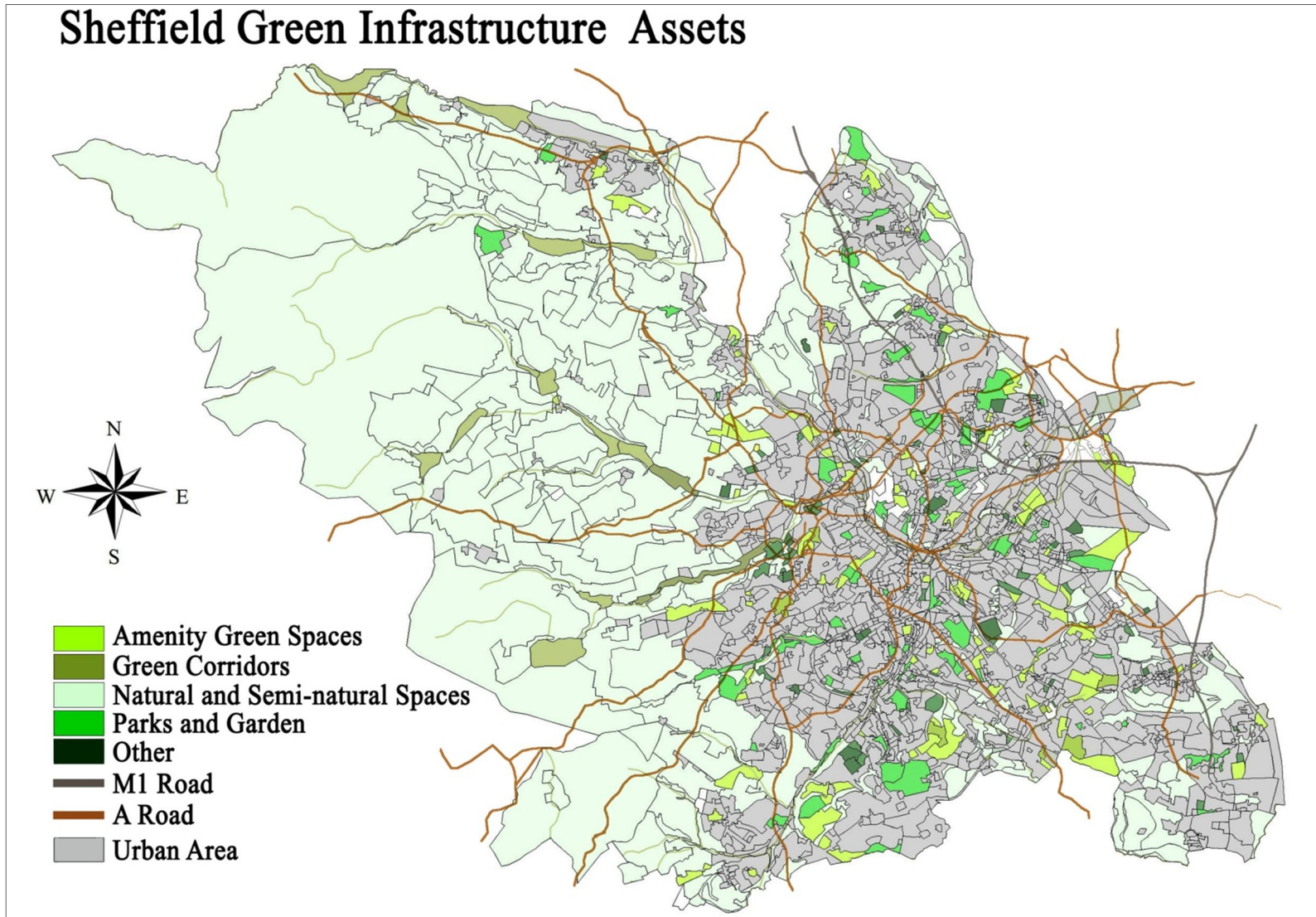
Parks and Gardens	urban parks, Country and Regional Parks, formal gardens
Amenity Green space	informal recreation spaces, housing green spaces, domestic gardens, village greens, urban commons, other incidental space, green roofs
Natural and semi-natural urban green spaces	woodland and scrub, grassland (e.g. downland and meadow), heath or moor, wetlands, open and running water, wastelands and disturbed ground), bare rock habitats (e.g. cliffs and quarries)
Green corridors	rivers and canals including their banks, road and rail corridors, cycling routes, pedestrian paths, and rights of way
Other	allotments, community gardens, city farms, cemeteries and churchyards

The map of green infrastructure has been used to make informed judgments about the context of green infrastructure. Compared with Map 5.2.3, the green infrastructure map contains much less information, and specifically shows the existing network of urban green spaces in the Sheffield area. Map 5.2.4 illustrates the features of existing green infrastructure including parks, managed open spaces, woodlands, rivers, canals, ecological sites and agricultural land. In the inner urban areas (grey area), the rivers, canals, multi-use routes, parks and gardens are contained. This map also depicts many features in the urban fringe and countryside (the light green areas).

This map shows the pattern of green infrastructure features in Sheffield, including parks, managed open spaces, woodlands, rivers, canals, conservation areas and natural sites. As revealed by this map, natural spaces in Sheffield are an important part of its green spaces. It is highly valued by local people such as a part of the Peak District National Park and agricultural

land in urban fringe (Beer, 2005).

The connection from urban to natural area is closely linked to green corridors such as rivers, canals and woodlands. These green corridors support networks of informal and ecological green spaces. In the inner urban area, the principal green infrastructure assets include parks, rivers, canals, multi-user routes, and amenity and recreation spaces. This map shows how the transport network introduced important physical barriers or linkages across the whole city together with green corridors. This provides information to understand the accessibility of sites and their links into natural areas.



Map 5.2.4: Sheffield Green Infrastructure Assets

5.2.1.4 Quality and assessment of green infrastructure

In order to assess quality green infrastructure, this mapping process is used as a walking buffer to determine accessibility to green spaces and other spaces. This considered how far people have to travel to access urban green spaces (Sheffield City Council, 2007c). The European Environment Agency (EEA) recommends that people should have access to green space within 15 minutes walking distance (Barbosa et al., 2007). Some studies prefer to measure walking distance rather than time. For example, Sheffield City Council promotes that people should live within a reasonable distance of an open space and a network of green spaces should be available in all areas in the city (Sheffield City Council, 2007c).

A standard distance is used to determine accessibility. English Nature (now part of Natural England) recommends that people living in towns and cities should have access to natural green space within 300 metres of their home (Barbosa et al., 2007; Davies et al., 2006; Natural England, 2012; The Environment Partnership (TEP), 2007b). Sheffield City Council has promoted a distance of 400 metres in the Unitary Development Plan (UDP) and the Site Categorisation Strategy. All these suggested walking distances are measured with specific size of site. However, in the present, a distance of 500 meters as assessment standard indicator has been adopted to determine the assessment of green spaces, with levels of supply shown by the following codes:

Yellow: all accessible green spaces walking distance within 500 meters by visitors

Red: all accessible green spaces walking distance within 1 kilometre by visitors

Blue: all accessible green spaces walking distance within 1.5 kilometres by visitors

Purple: all accessible green spaces walking distance within 2 kilometres by visitors

This process analysed green spaces at the large scale (city level in Sheffield area) and does not map specific sites and small scales. Conversely, it mapped urban green spaces within the city, not including natural and semi-natural land. For example, the Peak District National Park and

agricultural land are not included within the buffer.

In this current exercise, the sites included are those that have been designed, managed and used for public visitors and local residents. Map 5.2.5 includes four walking distance maps, according to the levels previously mentioned. According to Map 5.2.5, when this analysis is undertaken at the 500m, threshold, there are obvious gaps between these spaces. Combined with land use map (Map 5.2.1), it appears that there are particular gaps in the inner urban area (where there is a large residential area). However, when the distance is extended from five hundred meters to two kilometres, the whole urban area has been covered.

Map 5.2.6 overlaps these four levels of distance, from five hundred meters to two kilometres to show change in the gaps. This map shows the most deficient area. For example, in the city centre, there are some gaps when the buffer is set below 1.5 kilometres. This type of analysis indicates the opportunities to increase urban green spaces by managers and local authorities, to gain maximum effect.

It is necessary to point out that the series of distance buffer maps only shows physical access and does not clearly indicate how people can access these sites. Hence, some physical barriers might exist and may not be detected. On the other hand, the map does not include river corridors as part of the open spaces, and these could provide multiple benefits for people.

In order to understand the relationship between health and green and open spaces, this study mapped and overlapped the health rate within wards and the distribution of urban green spaces in Sheffield. On Map 5.2.7, a low rate of general health is shown in a dark colour and a high rate of general health in a light colour. From this, it emerges that the general health rate in the urban area is lower than the countryside and has fewer green spaces. However, combined with Map 5.2.7 and 5.2.8, the spaces in the centre of Sheffield have low population and the poorest health rate. In order to determine the relationship between human health and quality of environment, it should consider the amount of green spaces linked to people's activities. Therefore, considering Figure 5.2.2 with map 5.2.9, the poorer health areas have less green

space. Sheffield City Council has realised this, and states that urban green spaces have a role to play in promoting healthy living and preventing illness (Sheffield City Council, 2008a).

In order to provide a clearer notion of the quality of urban green spaces, a smaller scale case will be shown in the next part. Map is also included of the city centre (Map 5.2.10).

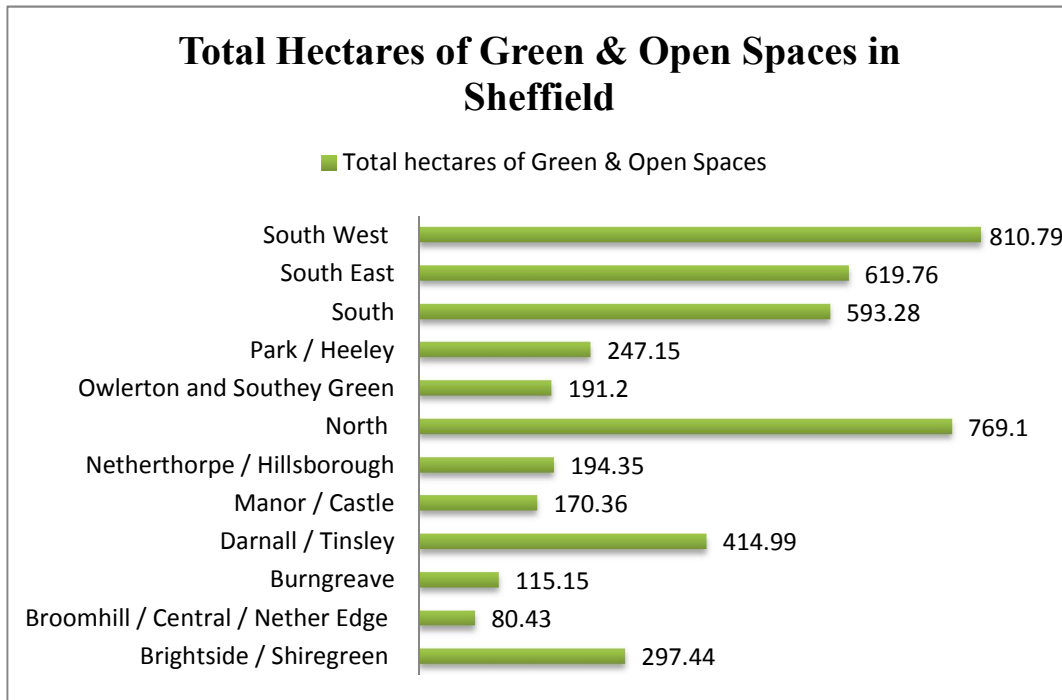
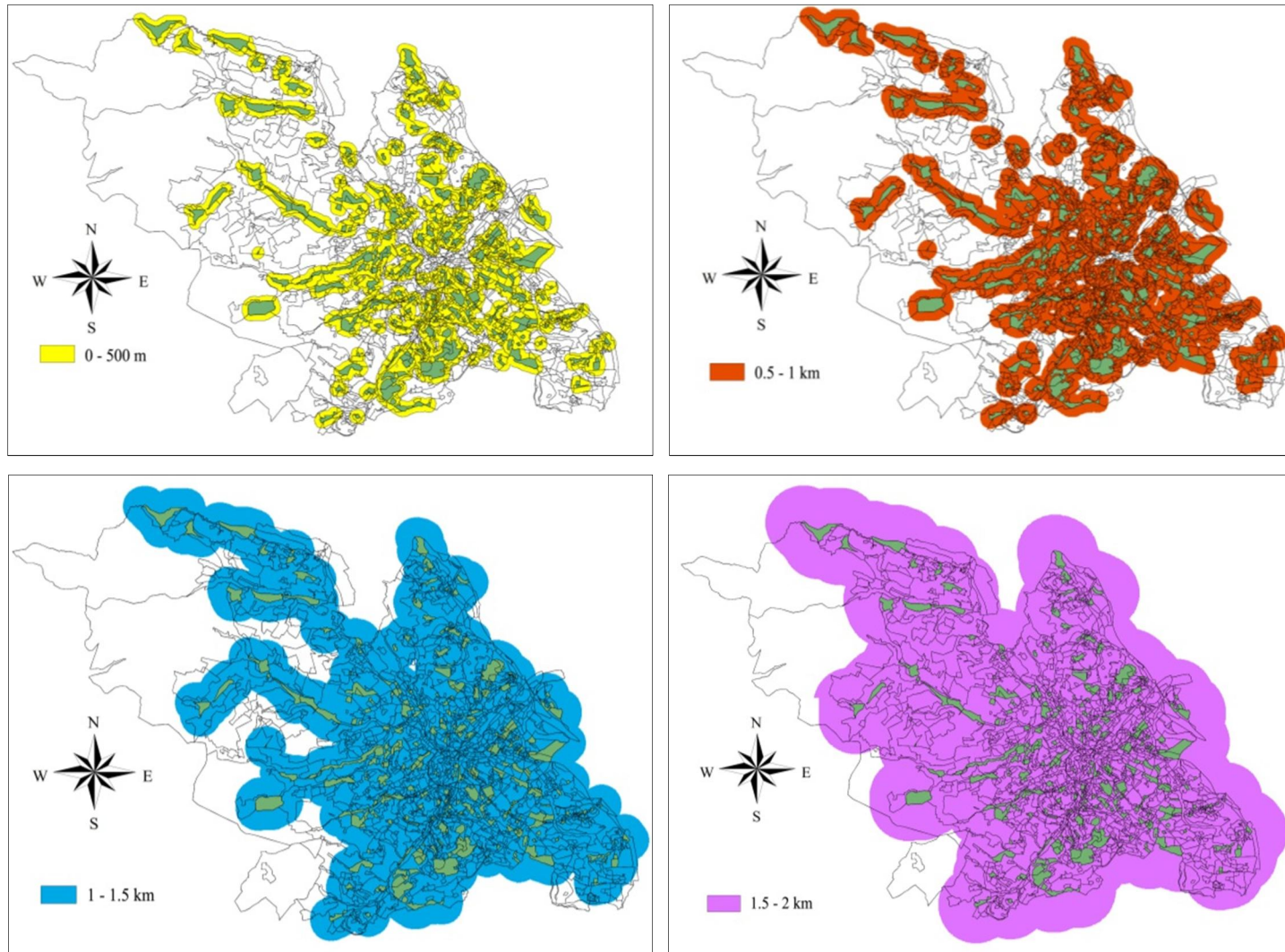
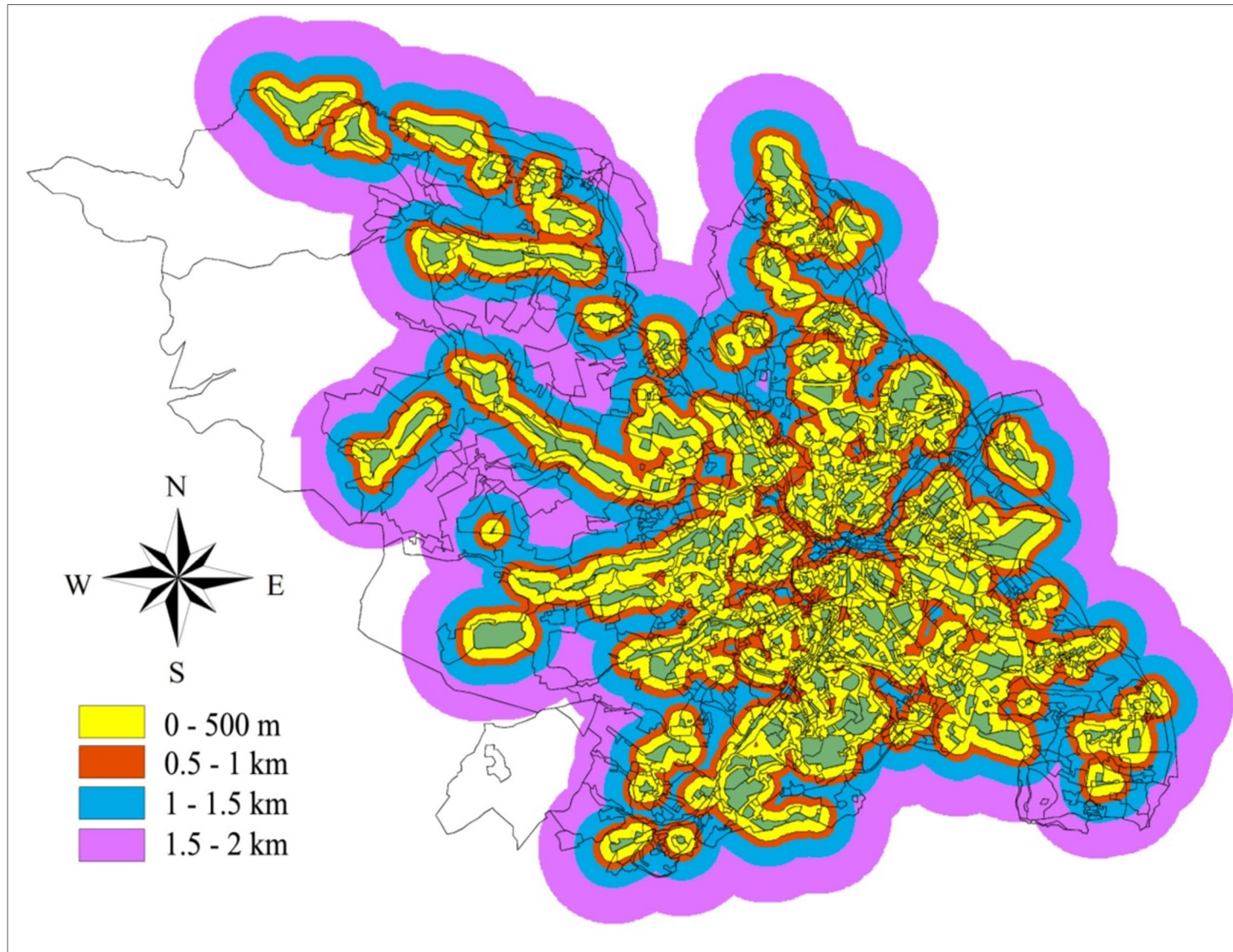


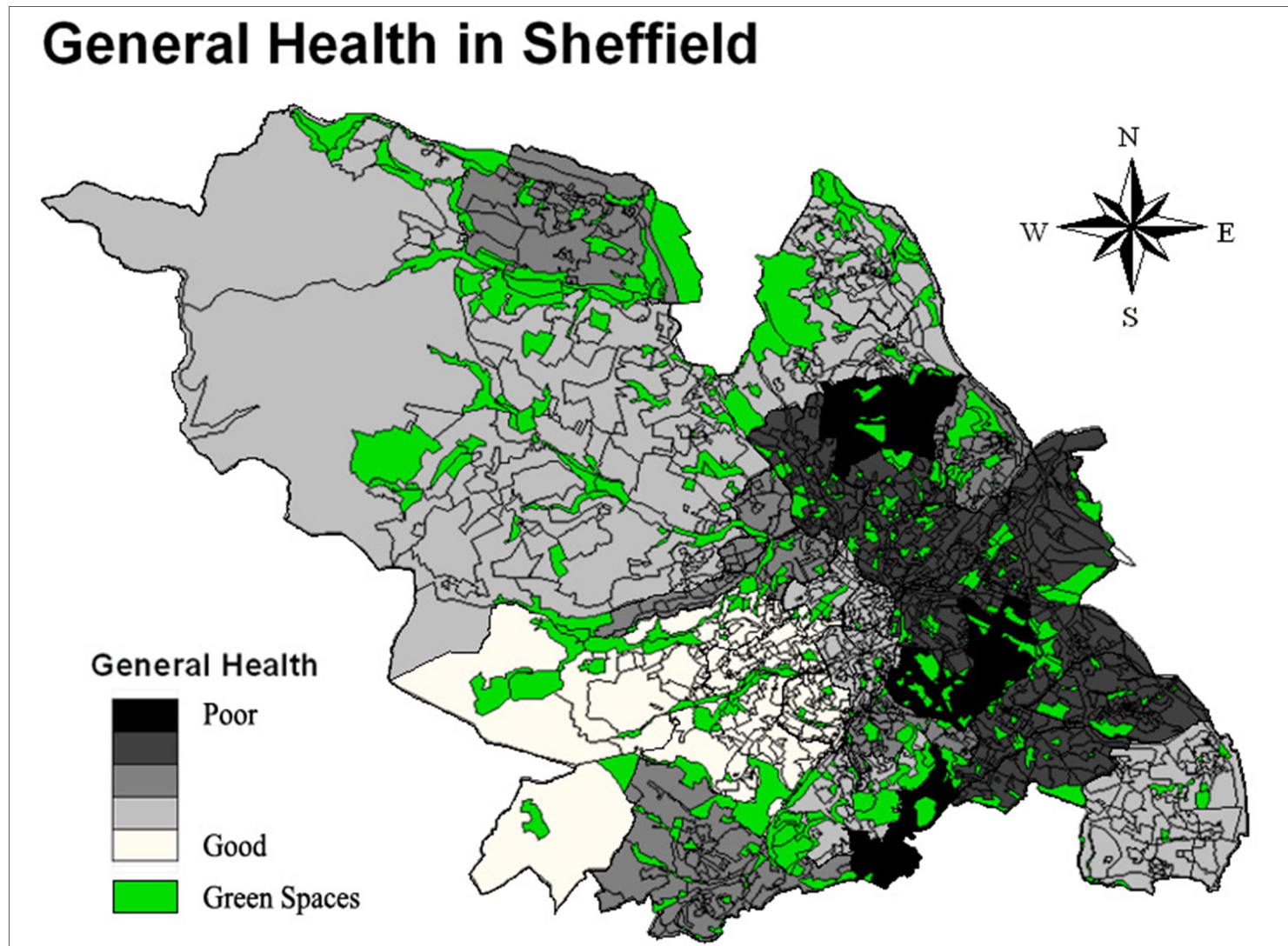
Figure 5.2.2: Total Hectares of Green & Open Spaces in each wards in Sheffield



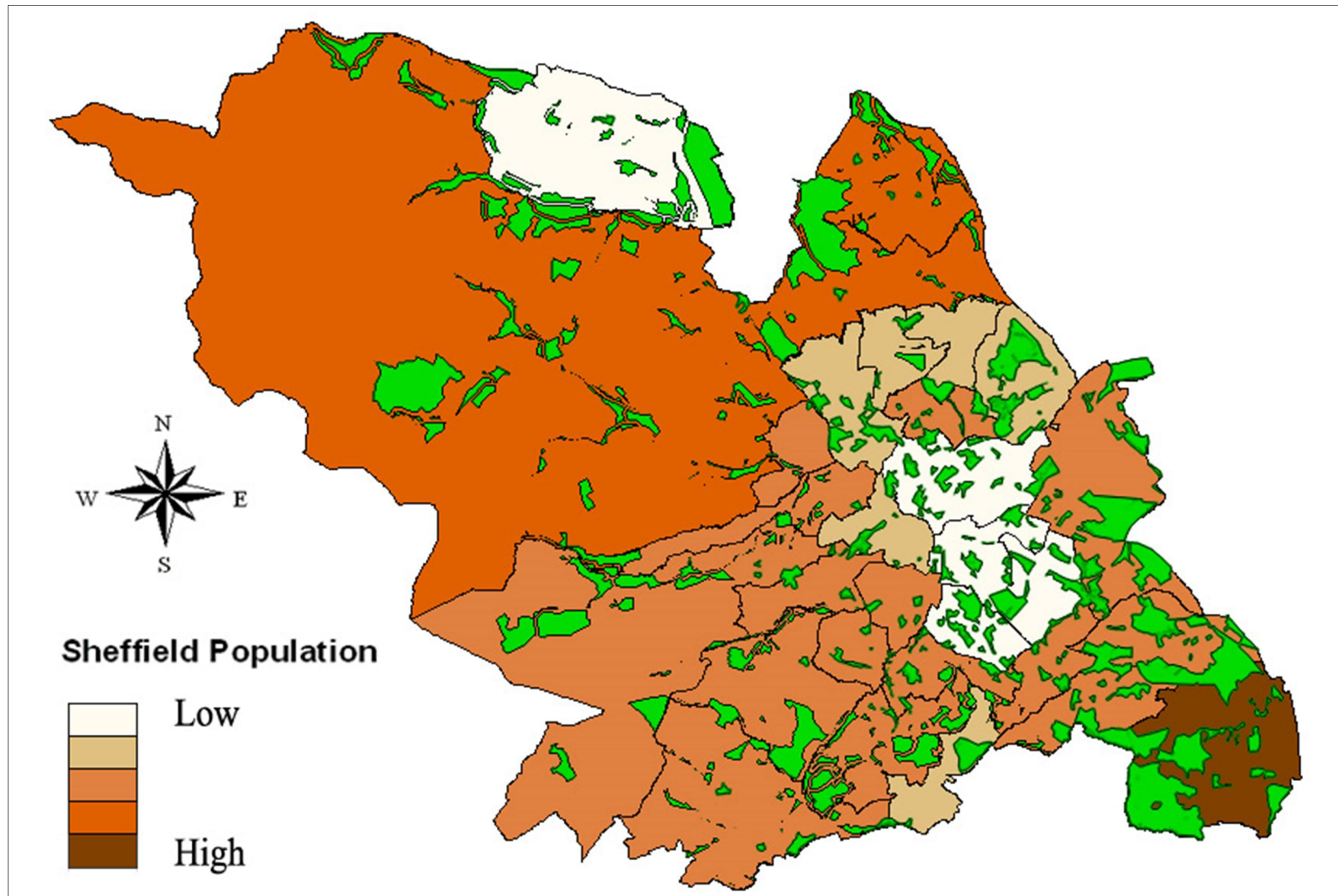
Map 5.2.5: Different distance buffer maps in Sheffield



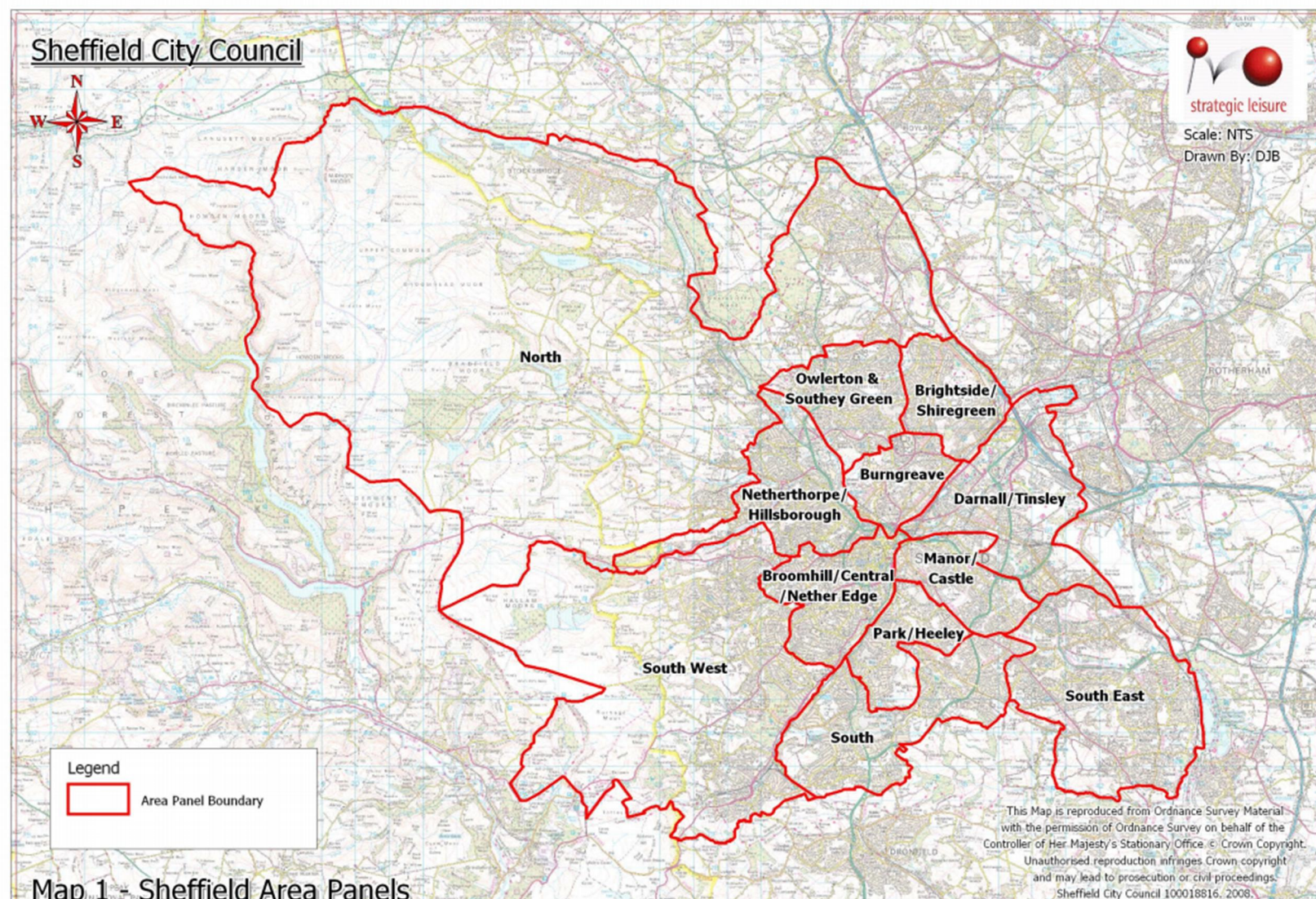
Map 5.2.6: Distance map of existing green spaces (0-2 km)



Map 5.2.7: Map of General Health overlapped with existing green spaces in Sheffield



Map 5.2.8: Map of Population overlapped with existing green spaces in Sheffield



Map 5.2.9: Map of Area Panels in Sheffield (Source from: Sheffield City Council, 2008a)

5.2.1.5 5000 m x 5000 m block example (Sheffield)

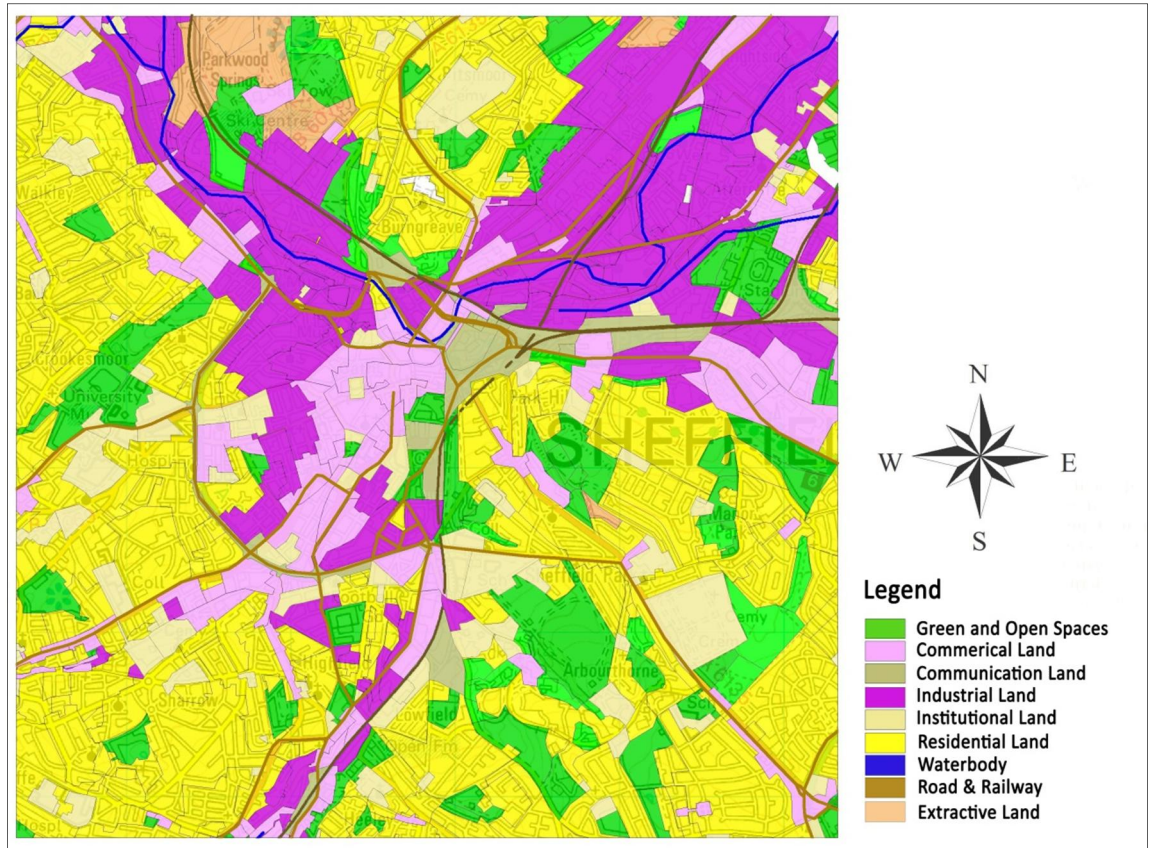
This small-scale case study selected a city centre area within 5000 metre by 5000 metre block area. The purpose of this study is to determine quality of accessible urban green spaces with details for better understanding of context in central area in Sheffield.

Map 5.2.10 presents general context of land use in 5000m x 5000m block in urban central area in Sheffield. In this area, a lot of industrial and commercial lands exist in this area and some residential places surround them. Accessible urban green spaces are embedded in this area, linked together by a road system. On the other hand, there is less green space in the central area as Map 5.2.10 shows.

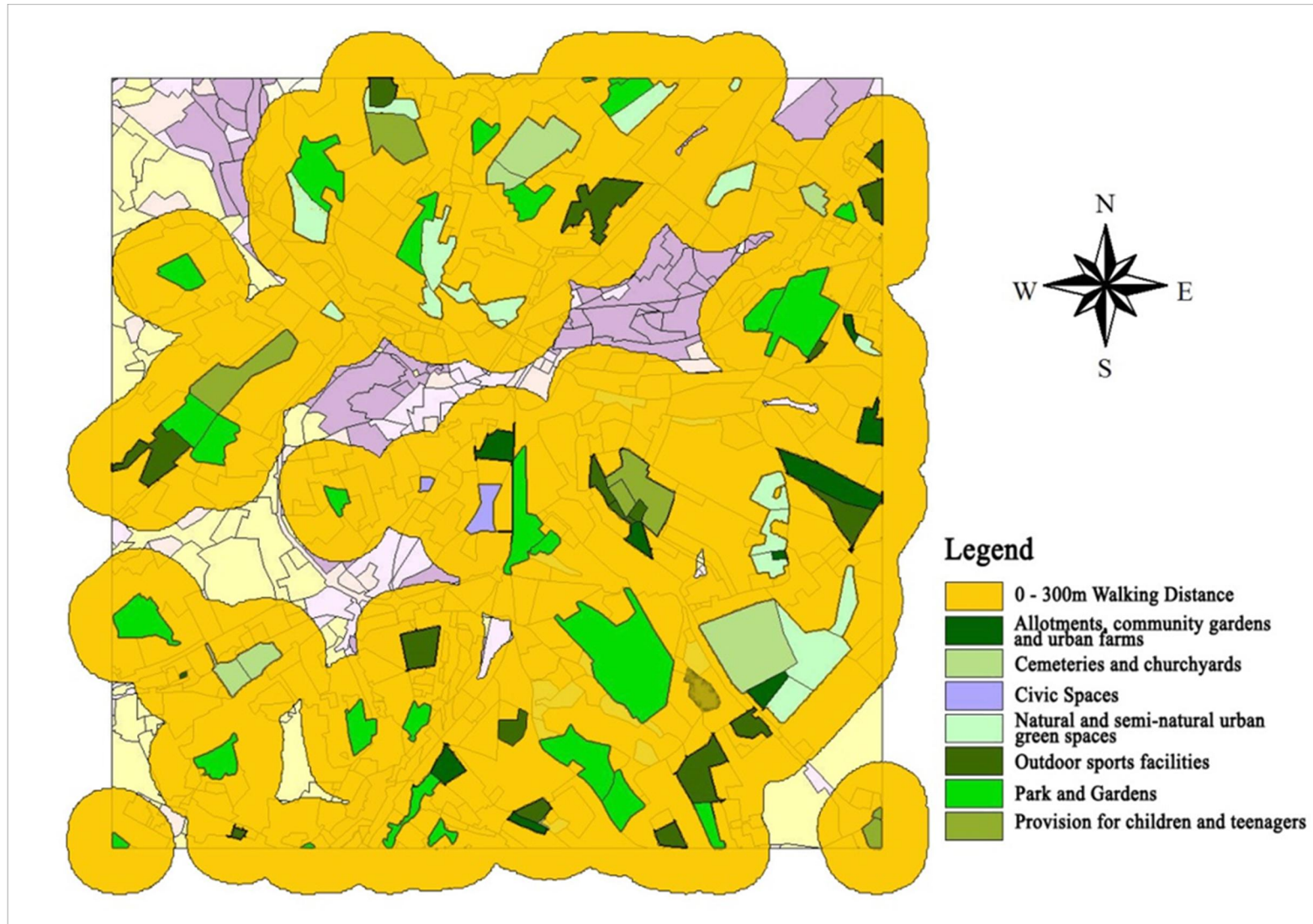
Map 5.2.11 represents a walking buffer to various types of green spaces within 300 meters in this studied block. According to this mapping analysis, most areas have good accessibility to urban green space within 300 meters walking distance. However, there are still some gaps in industrial area in this central area. Combined with Map 5.2.10 and 5.2.11, these spaces have road and river corridor across, and divided by transport and rivers.

Further, in order to understand different rates of accessibility, Map 5.2.12 presents a range of accessibility from different types of urban green spaces. The dark yellow area represents good accessibility which means that people have very easy access to green spaces, and there are more green spaces surrounding. Compared with Map 5.2.10 and 5.2.12, the areas of good accessibility of green spaces are surrounded by residential areas, and provide services for local residents. In contrast, the light yellow areas are surrounded by less green spaces, and also close to other types of land uses (such as industrial areas, commercial and institutional areas).

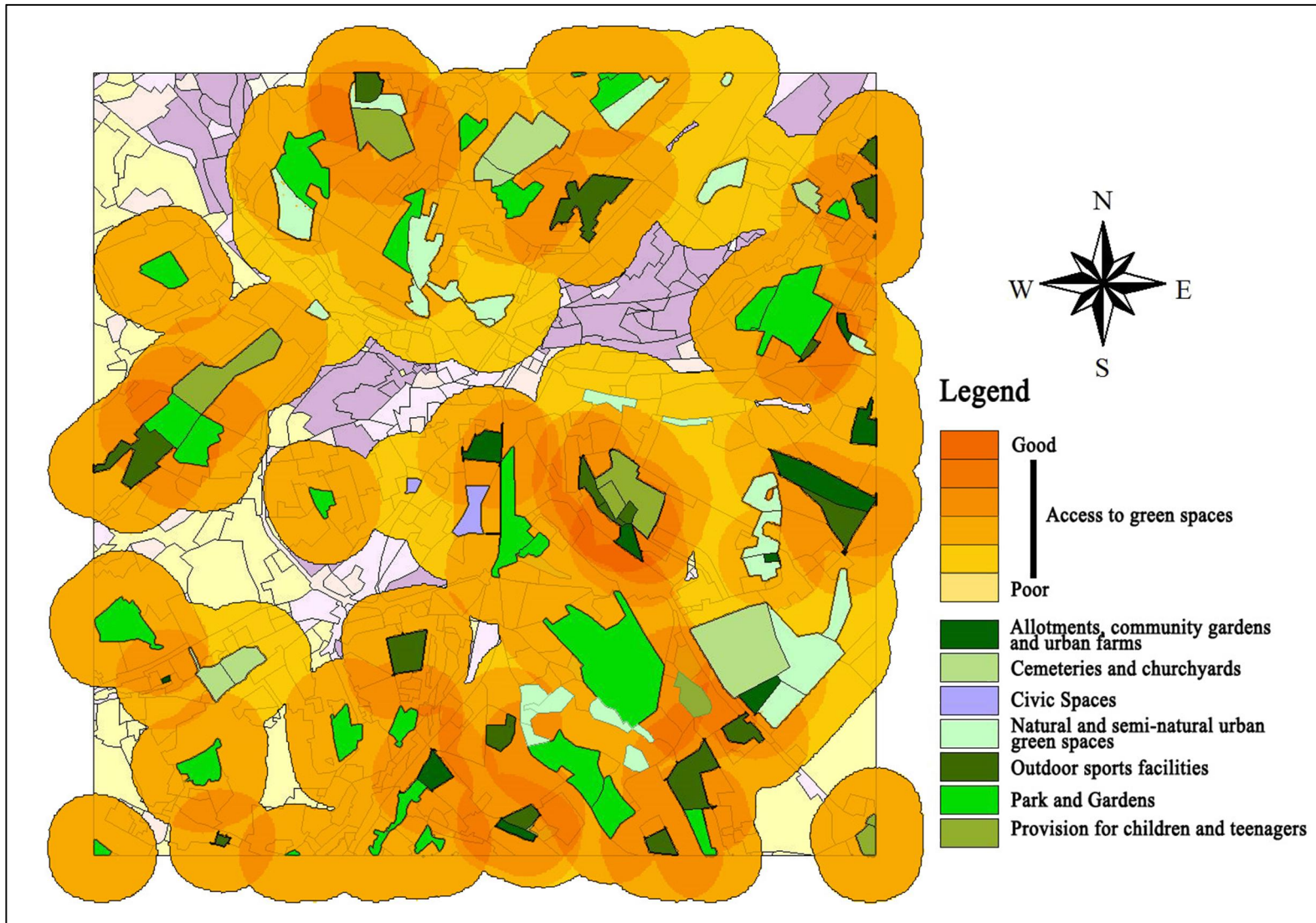
Generally, as Map 5.2.11 and 5.2.12 show, this studied block has some clear gaps of accessibility of urban green space in industrial areas, and also represents different values of accessibility in the 300 metre walking buffer area.



Map 5.2.10: Map of land use for 5000 m x 5000 m block in Sheffield



Map 5.2.11: 300 meter walking distance buffer map for 5000 m x 5000 m block in Sheffield



Map 5.2.12: Accessibility for walking to different types of green spaces in 300 m distance for 5000 m x 5000 m block in Sheffield

5.2.2 Management of green infrastructure in Sheffield

This part focuses on the management process of green infrastructure in Sheffield. It investigates the structure of management of green spaces by Sheffield City Council. It examines the implementation of policies and plans based on current procedures in written policy documents.

Secondly, it also considers the monitoring and measurement process in understanding the implementation of plans and policies. It aims to show how the local authority examines (or evaluates) the process of implementation and assesses outcomes in relation to initial objectives in plans and policies. It draws both on published sources and on interviews with officers.

5.2.2.1 Structure of landscape management in Sheffield

The Department responsible for managing urban green spaces both in the rural and urban area in Sheffield is called Parks and Countryside Service. Figure 5.2.3 shows the general process of landscape management in Sheffield. The Peak District National Park Authority is responsible for management of landscape in the National Park.

“Sheffield's Parks and Countryside Service (P&C) is responsible for the management, maintenance and development of the city's parks and recreational green spaces” (Sheffield City Council, 2011b, online). It manages 730 sites city-wide, covering the whole Sheffield city region (Sheffield City Council, 2011b, online).

“The Parks and Countryside Service and its partners have taken immediate action to address these priorities, through service and area plans...” (Sheffield City Council, 2010a). The service includes three sections which work together to provide a coordinated city-wide service in the Sheffield region: Park and Public Realm Section, Countryside and Environment Section, Policy and Projects Section.

Parks & Public Realm Section

This section is primarily responsible for daily management and maintenance on most sites, including parks and green spaces, gardens, playgrounds and hard landscapes. It also covers bereavement services and external consultancy to other users.

This section also provides some contracting arrangements from other client departments such as housing sites, where the section pays to maintain their spaces. This section also works with other departments in the management process. For example, an interviewee from this section stated that “... we work with our colleagues in the planning department in terms of developing green space. We also work with colleagues in Highways because a lot of green is connected with highways...” (Interviewee from Parks and Public Realm Section, Parks & Countryside Service, Sheffield City Council).

It also is responsible for the assessment and development of the Sheffield Standard which is used to determine quality of local urban green spaces in Sheffield.

Countryside & Environment Section

This section is responsible for community activities which include involvement of communities, partnerships and volunteers. It also manages woodland, trees and other natural sites countryside. Sports Pitches and Bookings is another unit in this section which is responsible for managing and running sports pitches. This section also contains the Ecology Unit to provide an ecological advice service for City Council departments, other organisations and members of the public.

Sheffield has a large natural and semi natural area which includes agricultural land, woodland and part of the Peak District National Park. In this respect, the Countryside and Environment Section gives technical support and management input with the woodland team, allotments

team and community partnerships.

Policy and Projects Section

Policy and Projects Section is responsible for co-ordinating specific policies, strategies and performance. It also works to improve service plans and workforce development, strategic marketing and communication. For example, as a leadership team, it is leading on the development of Sheffield's Green and Open Space Strategy.

In this section, a core management group brings together agencies and partners to consult on management, and developing programmes, projects and plans to meet the future needs and quality of green infrastructure for the city. This section also works with the planning department and other organisations and agencies such as universities to bring a range of expertise and knowledge together. Furthermore, this section also encourages community groups to join in the management process. As an interviewee described, the local authority department is looking very much for communities to come and join it, and bring more knowledge and support.

As mentioned before, the Parks and Countryside Service also works together with other departments to achieve better services and improve multiple benefits from urban green spaces. For example, it involved Activity Sheffield which aims to help Sheffield residents lead an active lifestyle and to lead the city to become more active, sporting and healthy (Sheffield City Council, 2013, online). The department also works with the Department of Highways to co-manage relevant green spaces which are connected with the highway.

In overview, the responsibility of the Parks and Countryside Service in Sheffield covers a range of spheres for managing urban green spaces, such as managing plans and projects, improved community involvement, and ecological and biodiversity measures. Staff from this department have recognised urban green spaces as green infrastructure (as a network) and produced visions and a series of plans, actions and priorities to improve and develop the

network of urban green spaces for multiple benefits. The management of urban green spaces is led by the Parks and Countryside Service, in cooperation with a range of partners, communities and other groups.

Further, the Parks and Countryside Service also encourages wide community involvement in the management process. Thus, as one interviewee noted, the Council cannot manage all the sites single-handedly and need to cooperate with wider groups and partners, and encourage more people to be involved in the process.

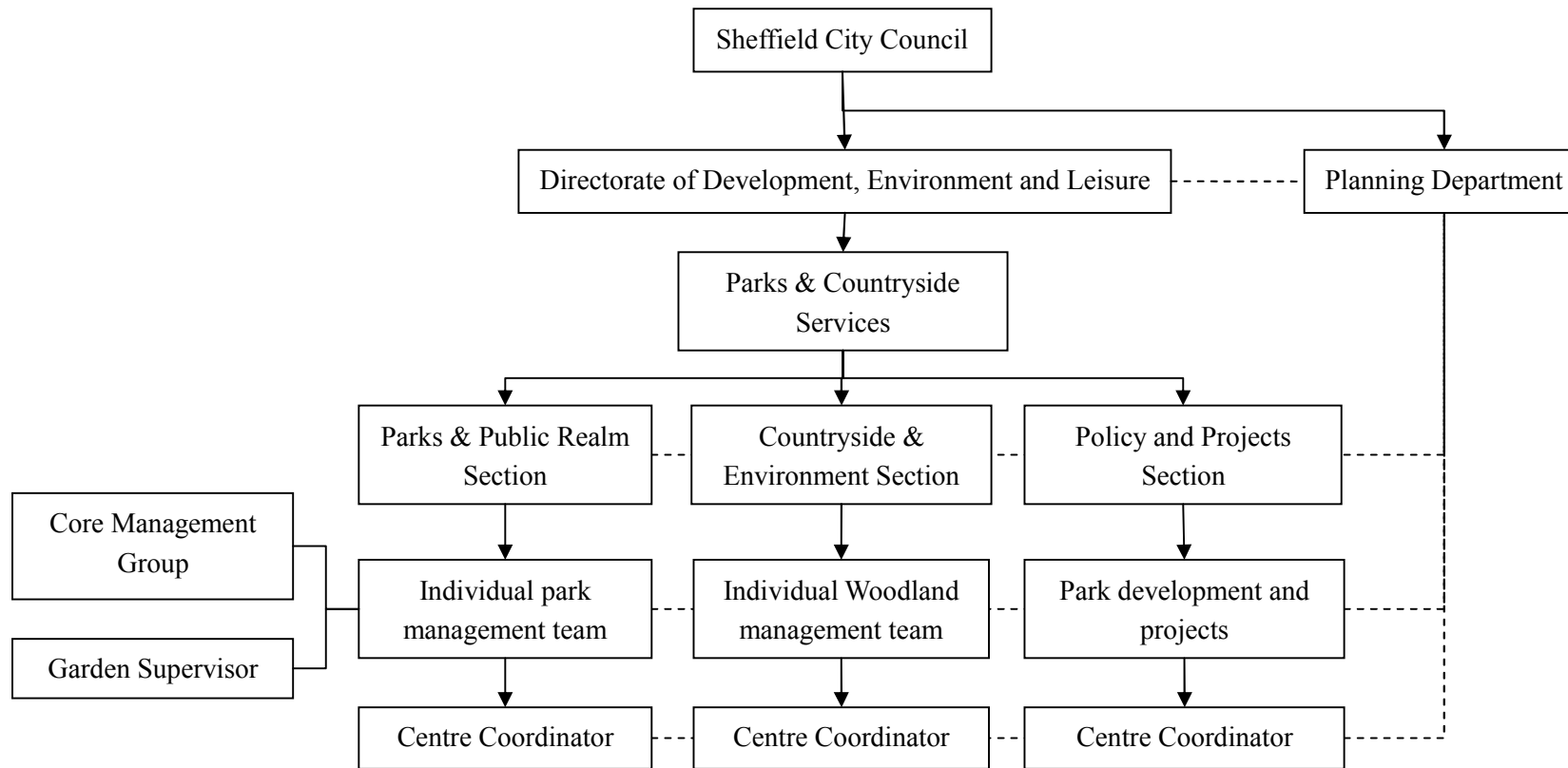


Figure 5.2.3 Organization of the Park and Countryside Service in Sheffield

5.2.2.2 Local Political context

This part reviews relevant policies and management plans to show the state of management and actions to improve green infrastructure. Sheffield City Council has produced various policies and plans for improved quality of green spaces. For example, Sheffield's Green and Open Space Strategy (SOGSS) is a strategy for developing spaces at the city level and generally provides visions and guidance on prospective actions.

The following Table (5.2.1) shows the relevant government documents from national level to local level. In 2012, Central Government published new national planning policy called National Planning Policy Framework (NPPF). It replaces all Planning Policy Statements (PPS) and Planning Policy Guidance (PPG). As a material consideration in planning decisions, local plans have to refer to NPPF first.

In respect of this, Sheffield City Council adopted the Sheffield Development Framework (SDF) to Sheffield Local Plan to reflect the NPPF. The SDF is a statutory development plan for the whole of the Sheffield area except the Peak District National Park. The Sheffield Local Plan contains saved policies from the UDP and Core strategy. The Sheffield Local Plan includes some policies to support development of urban green spaces for multiple benefits. For example, the Core Strategy includes environmental policies aimed at reducing the city's impact on climate change and at designing sustainably (CABE, 2007a; Sheffield City Council, 2010b, Vision Part 6, Core Strategy). It also expects to "*protect and enhance its natural environment and distinctive heritage and promote high-quality buildings and spaces*" (Sheffield City Council, 2010b, Vision part 7, Core Strategy).

Also, Sheffield City Council developed a Strategic Green Network policy CS73 to improve a network of green corridors within and close to the urban areas for providing multiple services, such as routes for wildlife, to recreational resources linking the city to the surrounding countryside. These relevant policies impact on Sheffield's Green and Open Space Strategy to

deliver more benefits and to raise the quality of urban green spaces throughout the city.

Supplementary Planning Documents (Table 5.2.1) are used to support the core planning documents. These documents cover a range of areas in the city. Some plans and documents work closely with the management and development of urban green spaces. For example, the Parks Regeneration Strategy (Sheffield City Council and Sheffield City Wildlife Trust, 1993) and Sheffield Green and Open Space Strategy (Sheffield City Council, 2010a) are important strategic documents which provide visions and objectives for managers, local authorities and relevant groups. Further, the Sheffield Standard as local quality criteria importantly guides local authorities to measure the quality of urban green spaces. The other documents also play different roles to support development of urban green spaces in varying degrees.

Besides, site management plans effectively help managers to improve and manage their parks and green spaces. In Sheffield, a number of parks have developed specific management plans and are supported by local council, owners, partners and communities.

In summary, the development and management of urban green spaces in Sheffield is based on a series of systemic policies from national level to local level. Through national policies to local strategy and plans, a vision of multifunctional green infrastructure has been articulated. Reflecting on these current policies, it appears that the local authority is developing a multifunctional green infrastructure agenda, which deals with many issues and opportunities such as climate change, regeneration, economic development and sustainable development. In Sheffield, the Council has planned and developed a series of projects and policies to encourage the maintenance of urban green spaces with multiple benefits.

Most influential national documents	PPG 17 (before 2012), NPPF (2012)	
	Regional Spatial Strategy	
	National Planning Policy Framework (NPPF)	
Planning Documents for the whole city	The Unitary Development Plan (UDP) (1990-2008)	
	The Sheffield Level Development Framework (LDF)	
	The Sheffield Local Plan (formerly the Sheffield Development Framework or SDF)	
	Sheffield Landscape Character Assessment (2011)	
Supplementary planning documents	Parks Regeneration Strategy (1993/99),	
	Sheffield's Countryside Strategy (1999),	
	Sheffield Site Categorisation Strategy (2000),	
	Best Value Review (2002)	
	Local Area Action Plans (2004 to present).	
	Sheffield Green & Open Space Strategy (2010)	Most recent documents
	Sheffield Standard	
Sheffield East Open and Green space Strategy		
Documents on sites	Site Management plans	

Overview of urban green space policy in Sheffield

A green space strategy is used to set out an authority's vision for developing its green spaces. It promotes the resources, methods and time to meet the goals and vision. *"It is a comprehensive, council-wide document, which should directly contribute to delivering the council's corporate aims and objectives set out in the community strategy"* (CABE, 2005a).

Sheffield has a long experience of developing a green space strategy. In 1993, Sheffield City Council published a long-term Parks Regeneration Strategy. The strategy proposed major changes in the way parks and green spaces were managed (CABE, 2005a). This strategy policy promoted various spheres such as improving management for people, wildlife and heritage, working with partnerships and communities to review and determine service standards, developing the range of services to support activities and making the best use of existing green spaces and bringing more resources in the services.

Through this strategy, Sheffield City Council achieved various developments in managing parks and green spaces. After its expiry, the Sheffield Parks Regeneration Strategy has been replaced by Sheffield's Green and Open Spaces Strategy.

Sheffield's Great Outdoors: Green & Open Spaces Strategy 2010-2030

Sheffield City Council approved Sheffield's Green and Open Space Strategy (GOSS) in 2010. The strategy developed a vision: *"to ensure that every area of the city has green and open spaces of exceptional quality for all current and future generations to use and enjoy"* (Sheffield City Council, 2010a).

This strategy provides a framework for planning, management and improvement of all types of urban green spaces in Sheffield, including both urban and rural areas. It included wider outcomes and management approaches such as setting up management foundations, which contents leadership for strategic and collaborative management, long term planning and budgeting and developing management plans for each type of site. Also, the strategy promotes working together with wider partnerships and communities, bringing more opportunities and adopting a stronger pursuit of a range of benefits.

The GOSS contains four themes to improve urban green spaces in Sheffield, namely, People, Places, Environment and Sustainability and Quality Management. Through these four themes, the Council pursues development of urban green spaces in a multifunctional sense (Sheffield City Council, 2010a).

The theme of People in this strategy aims to bring residents and their communities closer together with popular and well-used spaces. As the CLERE model (Barber, 2005) argued, green spaces help to strengthen the spirit of community amongst resident populations with shared interests. Activities and social impacts are helpful to improve the quality of green spaces. People's understanding therefore, encourages local authorities and managers to seek

more opportunities. Also, this theme aims to encourage people to adopt a healthy lifestyle and get more benefits from urban green spaces.

Further, the strategy also supported education and learning with more natural experiences with a different context from the classroom. According to this theme, urban green spaces are recognised as a green network to encourage diversity and inclusion. Therefore, providing for local needs, events and cultural projects are strongly promoted by this strategy.

The theme of People also reflected an understanding of multifunctional green spaces in the community. As Barber (2005) mentioned, urban green spaces also enable a wide range of recreational activity for residents and are largely free to users. The Sheffield Green and Open Space Strategy, therefore, includes clear policies to encourage and promote development of community involvement and social benefits from these spaces.

In order to improve all urban green spaces that were successful and well used, this strategy developed the Places theme. It planned four priorities for actions, namely making sites accessible and safe, achieving quality by design, valuing local character and heritage, realising economic value (Sheffield City Council, 2010a).

Through these priorities, the Council wishes to provide safe and welcoming spaces for people and easy access to these spaces. Therefore, the Strategy aimed to achieve quality design for different types of green spaces which are appropriate to the local and wider area.

Sheffield City Council also recognised the value of local character and heritage in its spaces. As the CLERE model stated *“landscape can help to define a sense of place, local character and identity”* (Barber, 2005, P.21). Sheffield City Council points out that its urban green spaces form an important part of the character of the city’s localities. *“They have been shaped by the economy and politics of their day - from the modern regeneration of civic spaces; to the designed formality of Victorian parks; or the wild landscapes of the Peak District National Park”* (Sheffield City Council, 2010a, P. 38). Thus, this theme delivers a series of policies to

protect and enhance key features and spaces to conserve local landscapes.

As the CLERE model promoted, Sheffield City Council realised that urban green spaces could bring multiple economic values. According to the text of the Strategy, green spaces have the potential for productive land use and income generation. A high quality environment creates opportunities to attract investment and employees to live and work in the city. Hence, the GOSS has policies to encourage increasing business opportunities for tourism and outdoor recreation within Sheffield's urban green spaces. Moreover, it also encourages business and partnership opportunities to engage in sustainable and productive development such as agriculture, waterways and renewable energy.

Third, environment and sustainability has been recognised as important to developing Sheffield as the greenest city in Britain. CLERE model (Barber, 2005) has stated that green spaces as an ecosystem provide services to the urban environment. This Strategy points out that green spaces support important plants, animals and habitats. Moreover, as ecosystems provide services, the Strategy recognised that urban green spaces have abilities for absorbing and storing water and carbon dioxide, filtering pollution and providing shade and cooling.

Sheffield City Council has realised that urban green space forms a core part of Sheffield's infrastructure. In order to support the green network policies of the Core Strategy, this strategy encourages the establishment of green connections for people and wildlife; it wants people to use and visit local urban green spaces. These links and urban green spaces are thought of as a green connective network which extends beyond the city boundary and ultimately connects with more areas. Hence, this network, as part of a regional network of green infrastructure, is promoted in the Sheffield Green and Open Space Strategy to deal with sustainability and multiple services.

Thus, this strategy recommended a series of policies to adapt to climate change, sustaining the quality of the environment, improved nature and biodiversity, and connections for people and wildlife (Sheffield City Council, 2010a).

In order to secure the full potential for people, place and the environment in Sheffield, the Council appreciates the importance of quality management. Hence, the GOSS supports a strategic quality context for the planning of the city's urban green space assets. Here, the management theme has to coordinate the work of a wide range of partners, managers and owners. Furthermore, it is also challenged to ensure secure resources for long-term management and maintenance. Thus, this strategy proposed that "*owners, managers and providers are seen to be working in a coordinated way around a common Sheffield Quality Standard and with a stake in achieving the long-term strategic outcomes*" (Sheffield City Council, 2010a, P. 48).

In this instance, the Quality Management theme delivered five priorities for action: providing leadership, achieving more with partners, developing quality standards, improving skills and competencies, securing funding and investment. For example, as one interviewee emphasised, it is impossible for a single local authority to own and manage all the urban green spaces in Sheffield. Therefore, the management of urban green spaces is coordinated with owners and managers. In order to achieve effectiveness and efficiency of quality management, one central organisation should assume responsibility and leadership for management and be able to take an overview and consistency in both standards and management planning. Moreover, the strategy also affirmed the Sheffield Standard as a baseline for work and to assure and receive consistent levels of provision.

Following these policies and proposals, the Strategy has a strategic plan with a twenty year time horizon. The local council realised that delivering the vision is a long term process which requires sub-outcomes to be achieved over a short time-scale, and step by step. Therefore, the long-term strategic plan is required and is used to maintain resources and provide direction for managers and partners throughout these incremental improvements.

In summary, Sheffield's Green and Open Spaces delivered a series of themes to improve the quality of urban green spaces with a wider range of benefits. These spheres that GOSS

considers range from ecosystem services, social impacts, and community involvement to quality management and securing budget resources. The Sheffield Green and Open Space Strategy provides a direction to local authorities, managers and partners for the future quality of urban green spaces.

Sheffield Standard

In order to provide guidance for high quality management of urban green spaces, Sheffield City Council has many proposals in GOSS to develop a local standard for managing and measuring quality of urban green spaces. Hence, Sheffield City Council has developed this professional standard over many years. It comes from traditional park management background, professional experiences and training. The Council has worked with key partners to establish the Sheffield Standard for all of its urban green spaces. It aims to achieve a visible improvement in the quality and safety of local urban green spaces. The Council also aims to bring more benefits in these spaces such as increased use, safer parks with reduced anti-social behaviour and an increased number of community activities on sites (Sheffield City Council, 2011c, online).

One interviewee from Park and Countryside Services explained that the local standard gathered different professional opinions and standards such as Green Flag, and other standards from other cities. The Green Flag standard is a significant piece of work to raise the quality of sites. Green Flag Award Winners in Sheffield are measured according to the Green Flag criteria. The Sheffield Standard is purposed for more ordinary sites in Sheffield. Therefore, the Sheffield Standard has been developed according to the basic elements of the Green Flag standard. The key principles of the Sheffield Standard are that sites should be welcoming, safe and secure, and clean and well maintained. Around these three components, the Standard sets out the sub-criteria and scores (Table 5.2.2). It primarily focuses on the kind of foundation level that ensures all sites can attain an improved quality.

In this context, the Sheffield Standard has full assessment criteria with a site typology. This is

important. For instance, infrastructure and service appropriate to a formal city park will be very different to those in a more natural site. Hence, it suggests assessment criteria to consider specific types of sites. The Sheffield Standard has developed 13 criteria and specific assessment points to score on site (Appendix 8).

In brief, the Sheffield Standard is different from the Green Flag Criteria. As stated by one interviewee from the Parks and Public Realm Section, the Sheffield Standard is prepared for local sites to be at the Sheffield Standard level. Sheffield City Council promotes the Standard as a way for managing and maintaining sites and is applicable to different types of site. According to the Sheffield Standard, the city could have a Sheffield Standard Woodland, a Sheffield Standard Park, as well as a Sheffield Standard Neighbourhood within a housing area, or even a Sheffield Standard Cemetery. In this condition, the Sheffield Standard is playing a significant role in improving the quality of local sites in Sheffield.

Table 5.2.2: Assessment Scores Table						
Criteria	Category	Score (0 – 10)				
A Welcoming Place	1 Welcoming					
	2 Good and safe access					
	3 Signage					
	4 Equal access for all					
	5 Community involvement					
Healthy, Safe and Secure	6 Safe equipment and facilities					
	7 Personal security on the site					
	8 Dog Fouling					
	9 Appropriate provision of facilities					
	10 Quality of facilities					
Clean and Well Maintained	11 Litter and waste management					
	12 Grounds maintenance, horticulture, habitat management					
	13 Building, infrastructure and/or equipment maintenance					
Sub total						
Score divided by 13 (or number of categories used in assessment)						
Sheffield Standard total score – multiply by 7						
Scoring						
Very poor 0,1	Poor 2,3,4	Fair 5,6	Good 7	Very Good 8	Excellent 9	Exceptional 10
Adapted from: Sheffield Standard Assessment Sheet (Sheffield City Council, 2011d)						

Site Management Plans

Normally, site management plans form an active agenda for managers and employees to implement appropriate management techniques and methods to ensure continued success and a sustainable future for the site management. The process of park management is monitored in different ways, such as staff meetings and representation each year. Each management plan has its own monitoring scheme.

In Sheffield, some parks and green spaces have achieved the Green Flag Award, which means that these parks have site management plans geared to the Green Flag criteria. In order to keep the standard of Green Flag, an annual assessment of these parks is held by park officers in cooperation with partners (Sheffield City Council, 2007b, 2008c, 2009a, b).

In Sheffield, 14 sites have won the Green Flag Award, and all of them have ten-year management plans to guide managers in managing and maintaining their sites. As Table 5.2.3 shows, these Green Flag sites include different types of parks and green spaces. Their management plans contain various aspects suited to their specific context. At the same time, some of the other sites also have management plans, which are prepared by site managers and local authorities. The management plan, structure of management has been developed from the Green Flag and CABA Spaces model (CABA, 2005b). These current management plans in Sheffield basically contain many common themes which are promoted by Green Flag. Furthermore, each site also has specific themes with particular standards; for example, a management plan for the site of Heritage Park status has to consider interests from English Heritage, Heritage Lottery Fund and policies from the UDP and SDF in Sheffield.

Sheffield City Council has already developed a strategy and local standards to improve its quality of all urban green spaces. Compared with the Sheffield Green and Open Space Strategy, specific site management plans may be quite simple and are indicated to direct practical work on site.

Figure 5.2.4 illustrates the general content of a management plan which is summarised from current management plans in Sheffield. This figure includes three main parts: first is delivering a vision and objectives, second is the detail of the plan for management and maintenance, and the third concerns implementation and monitoring plus resources. In order to understand the site management plan, an example of one follows to show its typical contents and how it relates to multiple benefits. This analysis examines how the plan is prepared, implemented and measured. It also illustrates how the plan reflects multifunctional phases in keeping with CLERE model.

The selected site is Weston Park, which is one of Sheffield's oldest and most important historic sites. A management plan for Weston Park's application for Green Flag status was produced in 2009, winning a Green Flag Award.

Green Spaces typology	The Green Flag Award Winners
Park and gardens	Cholera Monument Ground and Clay Wood
	Firth Park
	Norfolk Heritage Park
	Sheffield Botanical Gardens
	The Peace Gardens
	Winter Gardens
	Weston Park
	Meersbrook Park
Millhouses Park	
Outdoor sports facilities (with natural or artificial surfaces)	Tinsley Green Recreation Ground
Amenity green space	Devonshire Green
Natural and semi-natural urban green spaces, including woodland or urban forestry	Ecclesall Woods
	Wheata Woods
	Wyming Brook

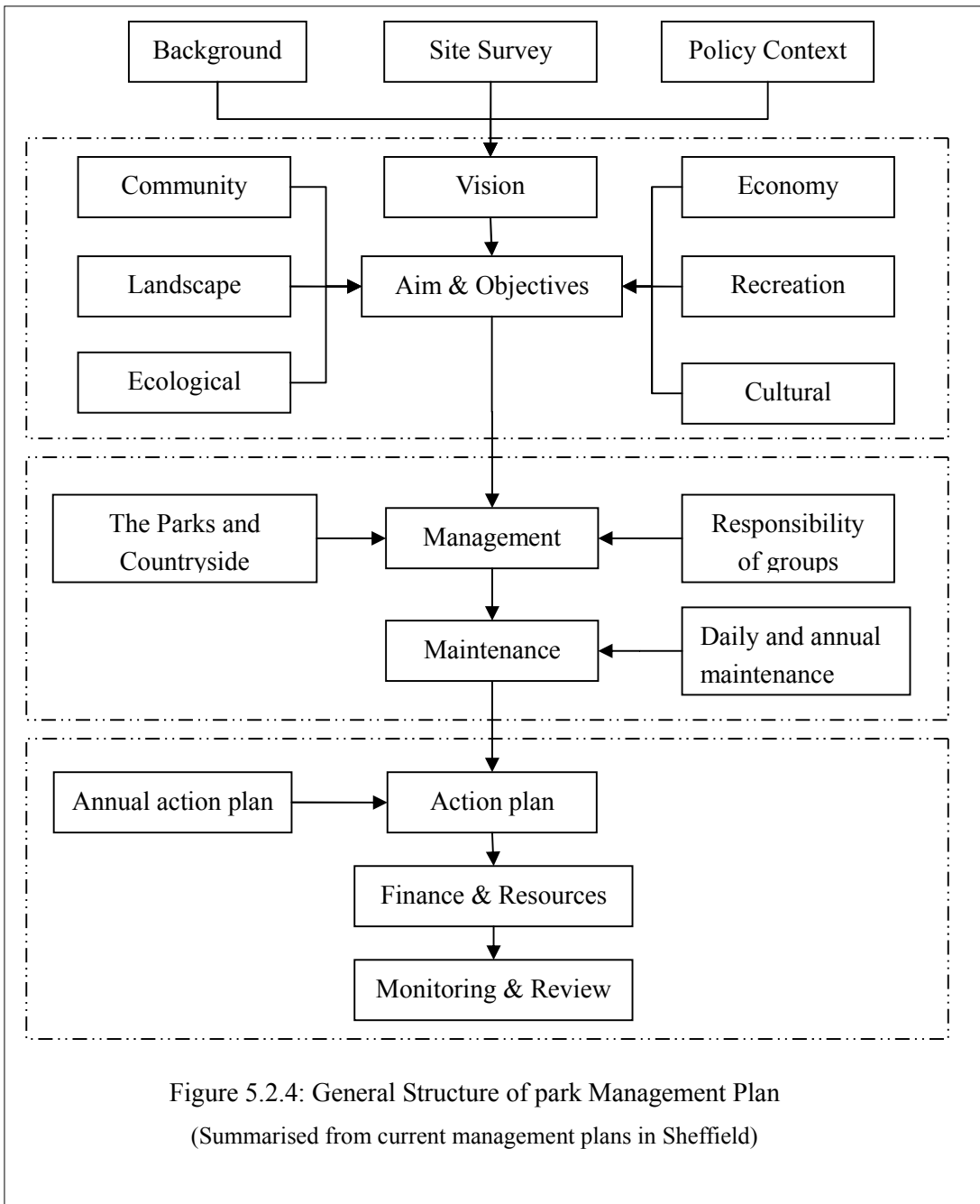


Figure 5.2.4: General Structure of park Management Plan
(Summarised from current management plans in Sheffield)

Example study: Weston Park Sheffield Green Flag Management and Maintenance Plan 2009 - 2019

Weston Park is one of the oldest and most important historic parks in Sheffield. As Figure 5.2.5 shows, it is situated 2 km west of Sheffield City Centre and surrounded by the University of Sheffield, Children’s Hospital, Crookes Valley Park and Pondersosa, including residential area and office spaces (Figure 5.2.6). The park contains a number of historic memorials,

monuments and structures, together with several small operational buildings. As an important historical park, it is Grade II registered on the English Heritage 'Register of Parks and Gardens of Special Historic Interest'. It is also on the local register of heritage parks in Sheffield City Council (Sheffield City Council, 2009c). Table 5.2.4 shows the general statistics of Weston Park. It is owned by Sheffield City Council and managed by the Park and Countryside Services.

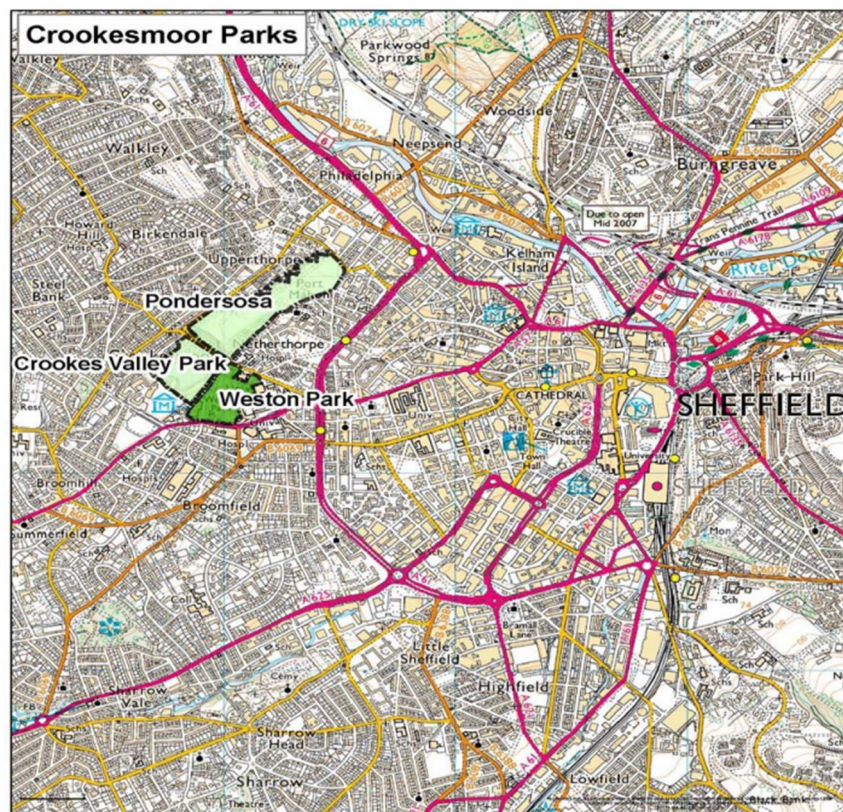


Figure 5.2.5: Location of Weston Park in Sheffield

Sources: Weston Park Management Plan (Sheffield City Council, 2009c)

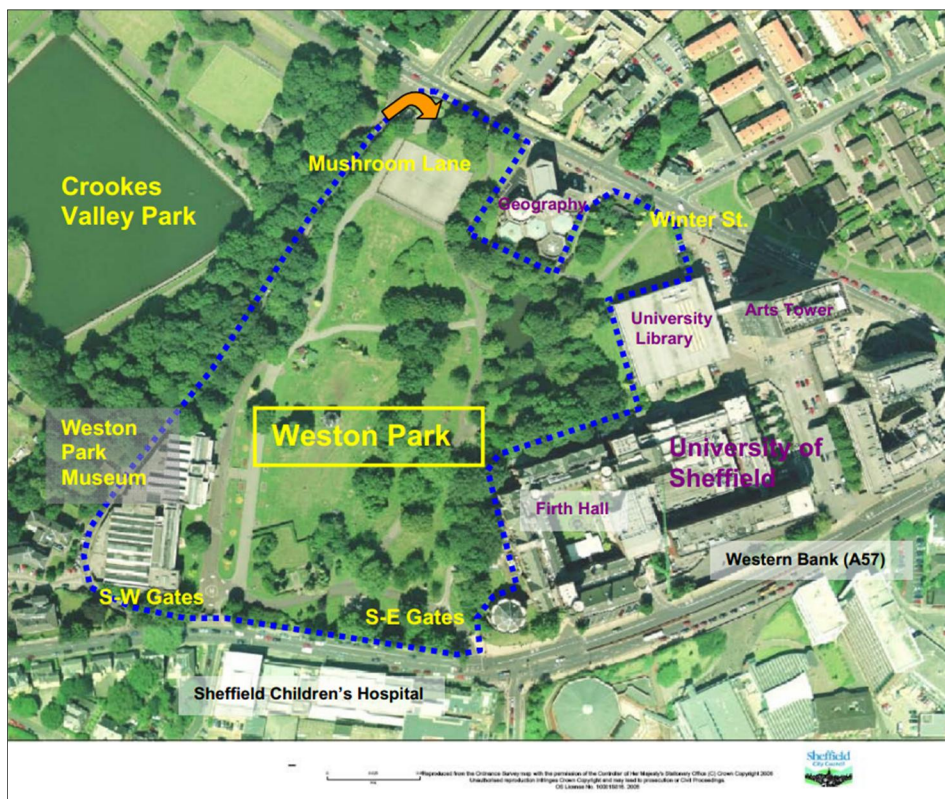


Figure 5.2.6: Map of Weston Park with surrounding environment in Sheffield
 Sources: Weston Park Green Flag Management Plan (Sheffield City Council, 2009c)

Table 5.2.4: Site Statistics - Weston Park	
Name of Site	WESTON PARK
Address	Weston Park, off Mushroom Lane, Sheffield, S10 2TP
Location	2 kilometres west of the City Centre
Size of whole site	5.10 hectares
Site Owner	Sheffield City Council (SCC) Parks and Countryside Service
Designations	a) The Park is designated as “Grade 2” on the English Heritage Register of Parks and Gardens of Special Historic Interest. b) Parks and Countryside Service listed as a City Park and Heritage Site. c) Locally listed on the UDP Schedule of Historic Parks. d) In addition to the Weston Park Museum, formerly known as the Mappin Gallery which is listed as Grade 2 by English Heritage, the park contains 7 other Grade 2 listed monuments and memorials. In addition the University Edgar Allen Building and the University Library are both listed as Grade 2 and face directly onto the park.
Constraints	a) Sheffield City Council bylaws with respect to Pleasure Grounds. b) Contracts with HLF. c) Weston Park Museum Lease
Sources from: Weston Park Sheffield Green Flag Management and Maintenance Plan 2009 - 2019	

The management plan of Weston Park has been prepared to ensure the park's historical landscape is protected and managed for modern uses. It is designed to reflect the specific needs of Weston Park and to ensure that appropriate management and maintenance regimes are implemented. The plan covers a period of 10 years and covers the requirements for Green Flag.

As this plan describes, the managers and involved parties have undertaken a site survey at first to understand the condition of current management and physical context. This assessment includes two parts: deskwork survey and field assessment which are both based on Green Flag Criteria. According to these assessments, a set of strengths and recommendations have been pointed out and used to identify where the park needs to be improved.

Therefore, in order to produce a successful management and maintenance plan, plan-makers have considered some themes for management issues: for example, how these themes could help to enhance the expectations of the stakeholders and wider community, to provide a safe and attractive space with well protected historical features and landscape (CABE, 2005b), and to provide a seamless experience for all users of the park, and achieve, and maintain Green Flag.

This park, as a historical site, is managed differently for woodland and natural conservation areas. It contains a series of historical landscape features. However, as one of the urban parks, Weston Park also has a number of facilities for park users, such as museum, cafe, toilets, bandstand, tennis courts and disabled parking bays.

A description of historical development and relevant elements in the park has been described in the plan. Moreover, the management plan also includes a section to explain its legal and planning issues to determine the current issues of management and maintenance.

Based on this general information and site survey, this management plan has promoted a

vision:

“To conserve, enhance, sustain and explain the heritage of Weston Park, while providing a safe, accessible and enjoyable experience for the local and wider community.” (Sheffield City Council, 2009c, P. 19)

To achieve the vision, this plan proposed eight aims with specific objectives for the following decade. Table 5.2.5 shows these eight aims with their objectives. As prepared for Green Flag, these aims are considered to fit the Green Flag Criteria. Also, these aims potentially cover a range of multifunctional outcomes extending from physical care to social and economic development.

Aims		Vision of aim
01	Creating a welcoming place	To maintain a high quality visitor experience
02	A clean and well maintained site	To provide a safe and clean environment
03	Preserving and promoting the Heritage of Weston Park	To conserve the historic, natural and built character of the park for enjoyment by the public
04	Marketing the site to increase awareness and usage	To provide a varied programme of events appropriate to the park To increase usage of the park and its facilities
05	Ensure a healthy, safe and secure site for recreation	To provide a safe and secure environment for park users and staff To maintain a high quality standard of care for visitors to the park
06	To manage the site through sustainable policies	To minimise the environmental and financial impact of the park while maintaining high quality standards.
07	To maximise community involvement in the management of the site	To ensure the management of the park responds appropriately to local community aspirations
08	To ensure that Weston Park is effectively managed	To ensure that Weston Park becomes a flagship park for Sheffield, setting and maintaining the highest standards.

Reflect outcomes to multifunctional view

According to this management plan, potential outcomes will ensure to achieve a vision which delivers multiple benefits. In order to understand the potential promotion of multifunctionality in the management process, the CLERE model is considered here as a basis for reflecting on the way the plan can support multifunctional urban green spaces.

For the community development and education

As a popular and historical park, Weston Park enjoys a range of groups involved in its management process, such as the Friends of Crookes Valley and Weston Park, the operational staff of Parks & Countryside (P&C), the Sheffield Galleries and Museums Trust (SGMT), The University of Sheffield and the Sheffield Children's Hospital. All these groups work together to achieve the proposals in the management and maintenance plan.

Therefore, the management plan of Weston Park recommended an aim (aim 7) to maximise community involvement in the management of the site. It aims "*to ensure the management of the park responds appropriately to local community aspirations*" (Sheffield City Council, 2009c, Aim 7). In order to achieve this aim, the plan recommended supporting its friends' groups on-going liaison with stakeholders and encouraging new user groups to become involved in the park.

Moreover, the CLERE model noted that community involvement could bring social benefits and help to conserve quality and multifunctional uses. Besides, it also benefits education. For example, children could learn natural environmental knowledge and skills through playing in the park.

Hence, community involvement is acutely important for improved effective management and has been recognised by managers and stakeholders. This plan suggested management and maintenance to meet the expectations of stakeholders and the wider community. Furthermore,

partners cooperate to review the annual management plan in consultation and prepare new work programmes to obtain and retain the Green Flag status.

Managing the park for landscape and conservation

The CLERE model proposed that parks and green spaces are cultural landscapes and a primary part of the city. Landscapes help to define the sense of place through historical and local character. As a heritage park, Weston Park has important historical landscape characteristics and elements which should be conserved and maintained to a high standard. In this respect, management of Weston Park is concentrated to conserve the historic, natural and built character of the park. The aim of the management and maintenance plan was to retain the park's historic characters in future development, using appropriate materials for repairs and maintenance. Therefore, this plan has the aim of "*preserving and promoting the heritage of Weston Park*" (Sheffield City Council, 2009c, Aim 3).

On the other hand, the plan also recommended providing a varied programme of events for enjoyment by the public (aim 4). It encourages increasing the use of the park and its facilities. For example, in this park, a range of teams works in conjunction with the Museum staff to organise a number of educational events that relate to natural and historical topics (Sheffield City Council, 2009c).

In general, managers and plan-makers for Weston Park have recognised the value of landscapes and conservation in the park. They promoted aims and objectives to retain heritage and local landscape character and to encourage more events and educational activities.

For the ecosystem and urban services

In terms of green infrastructure, this plan also focused on ecosystems and associated urban services. Interviewees confirmed that, managers measured some issues for sustainable development. For instance, they aim to increase the value of the park for wildlife and to

manage the site through sustainability policies (aim 8). The plan aims to optimise the balance between high quality maintenance and its environmental impact and supports using sustainable resources and recycling on the site.

Also, there are some proposals and actions to improve biodiversity in this park. The plan promoted actions to ensure a sustainable environment, for example, reducing the number and quantities of pesticides used in the park, continuing to promote a number of energy saving schemes, and the management of waste materials, water and green waste.

Besides, this park is a heritage park with its historical landscape character and traditional horticulture. Managers have to carefully focus on conserving the heritage interest and providing welcoming public space. Therefore, this plan proposed that replacement planting is carefully planned to fit the traditional vision for the park and any planting work has to be discussed with partners.

Managing park as a recreation resource for health and well-being

As the CLERE model mentioned, management of parks and green spaces should consider the space as a recreational resource for health and wellbeing, which might entail staging events, promoting sport, healthy lifestyles and conserving tranquillity.

This primary aim was to create a welcoming place which expected to increase visitors as part of the recreational function, although it is not a specific recreational aim. It proposed objectives to provide good pre-visit information, maintain attractive entrances, and work closely with museum staff to achieve a positive visitor experience (Sheffield City Council, 2009c). These objectives reflected the provision of facilities to park users for recreational activities and ensuring a high standard in the park.

As a popular site with a wide range of visitors and users, recreation is an important issue. In order to develop a better recreational landscape, the plan sought to provide a healthy, safe and

secure site in its fifth aim. The CLERE model stated that providing safe areas and resolving conflicts between users are consequential to the process of management in urban green spaces (Barber, 2005). The plan aimed to guide staff to maintain a high standard of care in the park.

For local economy

Good quality green spaces might bring many economic benefits to the local economy, like enhancing property prices and the value of the taxable urban asset base. Economic benefits always relate to other landscape functions, which have been mentioned by the CLERE model. For example, increasing community involvement might help to promote tourism and create a sense of place and bring more investment for creating jobs (Barber, 2005).

This Weston Park Sheffield Green Flag Management Plan has proposed a marketing strategy to increase awareness and usage. Weston Park as an urban park has traditionally been a venue for a range of events attracting people from the city. It has a number of facilities such as the museum, cafe, tennis courts, bandstand and disabled parking bays. All these facilities are freely available to park users (Sheffield City Council, 2009c).

However, in the management plan, an economic vision does not emerge as a key issue in its own right. The local authority has produced a separate strategy for economic growth which is not included in this plan. In this regard, however, the plan proposes to review running costs to identify potential savings annually, and to hold events with the ranger services which promote place-making. For example, events might have a net cost and should be viewed as adding value for people, rather than as being income generators.

Moreover, this plan also encouraged creating opportunities for conservation and horticultural skills development. The dedicated staff within the Park attend a number of training programmes each year to improve their skills and expertise.

Thus, the management plan for Weston Park reflects some economic ideas, although these are

not explicit in its aims and proposals. The potential economic aspects in the plan relate to a range of issues mentioned by the CLERE model. This Plan is helpful to stimulate economic development through welcoming visits, effective management and marketing.

Furthermore, this management plan has a vision to ensure effective management and maintenance. It illustrates a structure of relevant staff and groups (Figure 5.2.7). As this plan described, the Park Officers and the Park Managers are directly dealing with the management of the park on a day-to-day basis. By ensuring cooperation between various management services, such as the trees and woodlands managers, the outdoor events team, the management plan aims to ensure that “Weston Park becomes a flagship park for Sheffield, setting and maintaining the highest standards” (Sheffield City Council, 2009c).

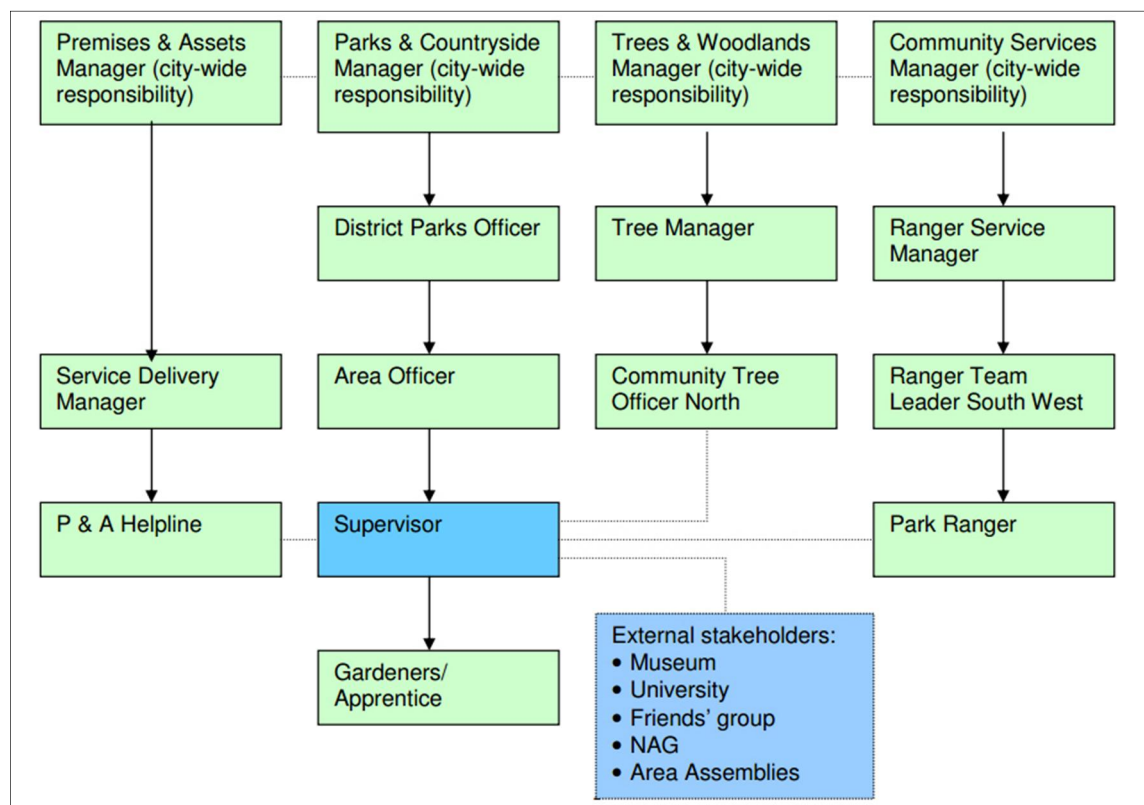


Figure 5.2.7: The relationship between relevant staff and groups

Source: Weston Park Green Flag Management Plan (Sheffield City Council, 2009c)

Summary

The management plan of Weston Park has covered many aspects of multifunctionality which are promoted by the CLERE model. It focuses on improving wide community involvement, creating a safe and attractive public space for leisure and recreational activities, keeping historic landscape character with a high quality standard, and maintaining Green Flag status.

Weston Park is a popular site in its surrounding area with lots of visitors, who work in this area. It enjoys a number of communities within the management process. Friends groups and related communities help to improve the quality of the park with many social events and supporter achievements. Community involvement is well promoted by the Weston Park Green Flag Management Plan. It covers most of the management issues mentioned in the CLERE model.

As a busy park with surrounding groups, Weston Park has rich recreational functions and benefits for people who use and visit the park. The management plan proposed a series of actions and proposals to increase recreational activities within a safe, clean and welcoming environment.

In order to enhance urban and ecosystem services, this plan contained some proposals for sustainable development. For example, it encouraged recycling resources and increasing wildlife. Nonetheless, as a heritage space and designed urban park, it does not strongly emphasise ecological aspects in the plan. On the other hand, as a popular space, the plan contains many proposals to market the park and to increase its social and economic impacts.

To sum up, the Weston Park Management and Maintenance Plan has proposed retaining high standards and developing multiple benefits within the landscape character, which can be considered as an approach toward promoting multifunctionality. The management plan covers a twenty year period and has listed a series of management issues which will be improved over the planning term. The importance of the management plan is as a framework and guide to help managers achieve a sustainable state and high quality management and maintenance, with

the Green Flag status.

Figure 5.2.8 illustrates the relationship between management aims in the plan and multifunctional aspects of urban green spaces. Reflecting the CLERE model, the management of Weston Park aims to deliver multifunctional benefits.



Figure 5.2.8: Management aims reflect multifunctional aspects in the Weston Park Management and Maintenance Plan

5.2.2.3 Monitoring and assessment of urban green space management

The purpose of studying the monitoring system is to understand how local authorities examine or evaluate their implementation process and check the results between implementation and the initial objectives in plans and policies. The first part of the analysis looks at procedures in the local department which is mainly in charge of the management of urban green spaces in

Sheffield. Second, the study looks at the monitoring schedule in plans and policies which guide and influence implementation.

(1) Mechanism of management at departmental level

As explained earlier in this section, Parks and Countryside Services is in charge of the management of all urban green spaces in Sheffield except the part which lies in the Peak District National Park. It takes responsibility for implementing and monitoring the Sheffield Green and Open Space Strategy.

Furthermore, the Parks and Countryside Service regularly undertakes consultation and surveys to gain feedback from both existing and potential users on managed sites. The department has a core management team that is responsible for monitoring the implementation and context in the managed area and reporting to the Director of the management team, and to the Chief Executive and political leaders of the Council.

In Sheffield, the Green Flag Assessment is used to measure a number of Green Flag sites. The Sheffield Standard is used for local sites. About three percent per year of sites newly achieve and sustain the Sheffield Standard. By 2012, 385 Sheffield Standard assessments had been completed. To monitor these sites, the Department undertakes re-assessments, and these results are reported to senior team managers. One interviewee explained that these performance indicators and measurements cascade from a part of the business plan, and that an assessment is held each year to evaluate sites for the Sheffield Standard. Then they improve these spaces based on feedback from the evaluation. After, the group will do a re-assessment of these sites, and see how their scores compare to the previous evaluation.

Moreover, Sheffield City Council has promoted Community Assemblies in seven political areas to help decide how the Council could deliver services in the city. These Community Assemblies are non-government groups which provide feedback for the Council from people who are living and working in the localities. They are therefore well placed to comment on

green spaces. This feedback informs a periodic audit, so the Council can assess the condition of different sites in terms of perception by local people.

(2) Measurement and monitoring approaches in plans and policies

Sheffield's Green and Open Space Strategy has established a monitoring scheme to ensure its proposals and visions can be achieved. Accordingly, the Parks and Countryside Service has created a Green and Open Space Management Group which consists of a range of the key urban green space owners, managers and providers to drive their vision. They monitor the plans, targets and outcomes from the GOSS on a regular basis.

This Strategy proposed developing rolling two year action plans from 2010 by core management groups. Key indicators, which are from both national documents and from the Local Area Agreements, provide important measures for external accountability (Parks and Countryside Service 2010). On the other hand, strategic priorities are reviewed on a five year basis and updated accordingly (Figure 5.2.9).

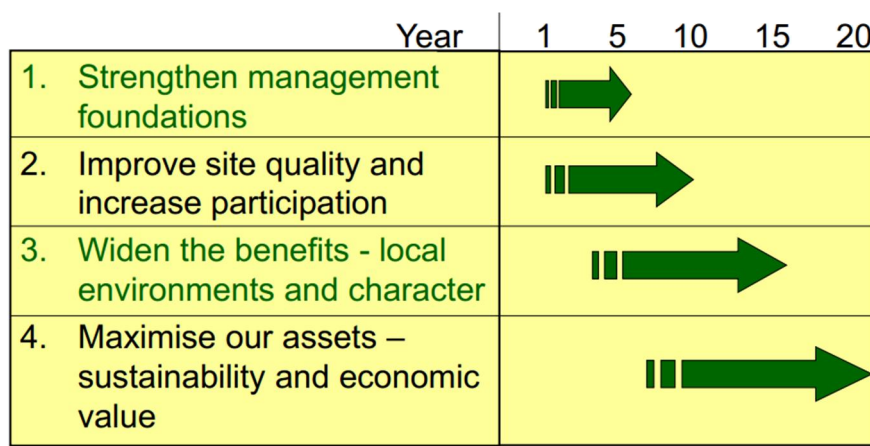


Figure 5.2.9: 20 year Strategic Plan (From: Hargate and Turner, 2012)

Also, the Sheffield Green and Open Space Strategy promoted further improvement through action plans. Many public bodies play an important role in the improvement of urban green spaces in Sheffield. Hence, the strategy also proposed Community Area Assembly Plans to

support the two year rolling action plan (Figure 5.2.10). In this process, friends groups, local residents associations, interest groups and key partners will consult to ensure plans and strategies are steered to local needs, through their area-based working (Sheffield City Council, 2010a).

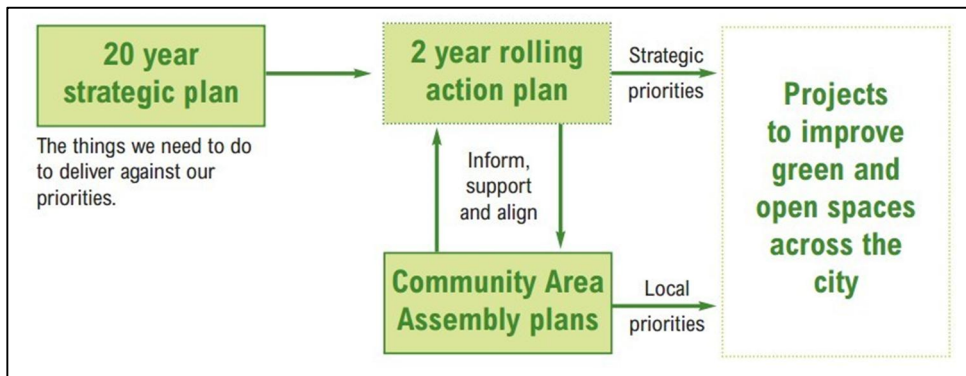


Figure 5.2.10: Process of the Green & Open Space Strategy Plan in Sheffield

(Source: Sheffield City Council, 2010a, P. 66)

Measurement/Monitoring on sites

First, according to the Sheffield Standard, an assessment team within Sheffield City Council will identify the current conditions on sites. The Council regularly holds audits of their sites and maps the results of these audits. Based on this, the Council carries out a three to four yearly check on the conditions, based on the quality map of the city.

The site management plans usually form an active agenda for managers and employees to implement measures and to ensure success and sustainable development for the future on their managed sites (Sheffield City Council, 2007b, 2008c, 2009a, b, c). The process of monitoring is undertaken throughout the year, through staff meetings and in response to representations from stakeholders.

On the other hand, two methods, as external monitoring and assessment and a survey of public use and satisfaction are used to review the implementation and gain feedback. External monitoring and assessment is usually undertaken through site visits and looks at standards

within green spaces, for instance as a Green Flag Assessment. Moreover, the Parks and Countryside Service and park managers encourage park users and visitors to give feedback to staff through friends groups and other relevant communities. Site surveys and regular meetings with Friends or other stakeholder groups ensure that the management of the sites could reflect the needs of the community and visitors.

Also, the Parks and Countryside Service promotes a monitoring process every two years for some parks and sites. For example, in some woodland areas, recording the monitoring process is one way to monitor the process of management (Sheffield City Council, 2007a). Furthermore, the monitoring actions are not only undertaken by Parks and Countryside Service, but also by relevant groups such as the Sheffield Wildlife Trust.

On the other hand, facing a serious economic impact, the Council has had to cut back some financial budget on urban green spaces. In this case, the Council encourages more communities and partnerships to be involved in the management and development of urban green spaces. This includes management, monitoring and re-development sites in Sheffield and also contains a series of regeneration projects to bring more benefits such as economic activity, social events and ecological benefits. These changes will also be incorporated into the monitoring process.

Monitoring schemes in plans are tailored to achieve their specific management aims. For example, the review of the Green Flag management plan is aimed at achieving the standard of Green Flag. The managers and monitoring groups have to consider how these sites have met the Green Flag requirements. This also supplies potential opportunities to improve quality on the monitored sites and attract more investment.

Therefore, the monitoring and measurement process not only benefits the managers through the management process, but also brings more potential benefits and opportunities for future development.

5.2.3 Conclusion

In summary, this section studied the green infrastructure context and management conditions to identify multifunctional management approaches including their management structure, relevant policies, and monitoring process in Sheffield. The specific context of urban green spaces in Sheffield is mapped and evaluated to illustrate their position, types and relationship as physical context in the city.

Also, it analysed the management structure and its relationship with planning and policies, it explained the role and function of the Parks and Countryside Service in the wider Council management process. Here, the multifunctional aspects of landscape management in Sheffield have been revealed through policies and actions at the local level. Compared with aspects of CLERE model, it also investigated multifunctional considerations in measuring and monitoring local plans and evaluation standards (like Sheffield Standard).

5.3 Existing Green Infrastructure in Yuci (China)

This section addresses the green infrastructure context in Yuci City in China. The first part uses GIS data to represent physical conditions and various types of green spaces in the city. Through this process, it reflects general information enabling comparison with Sheffield exploring and understanding their relative conditions. The second part investigates landscape management within planning and policies in Yuci. It contains policy aspects and also shows the management context and governmental structure in the city.

5.3.1 Green infrastructure context in Yuci

5.3.1.1 Establishing the Green Infrastructure Baseline Map

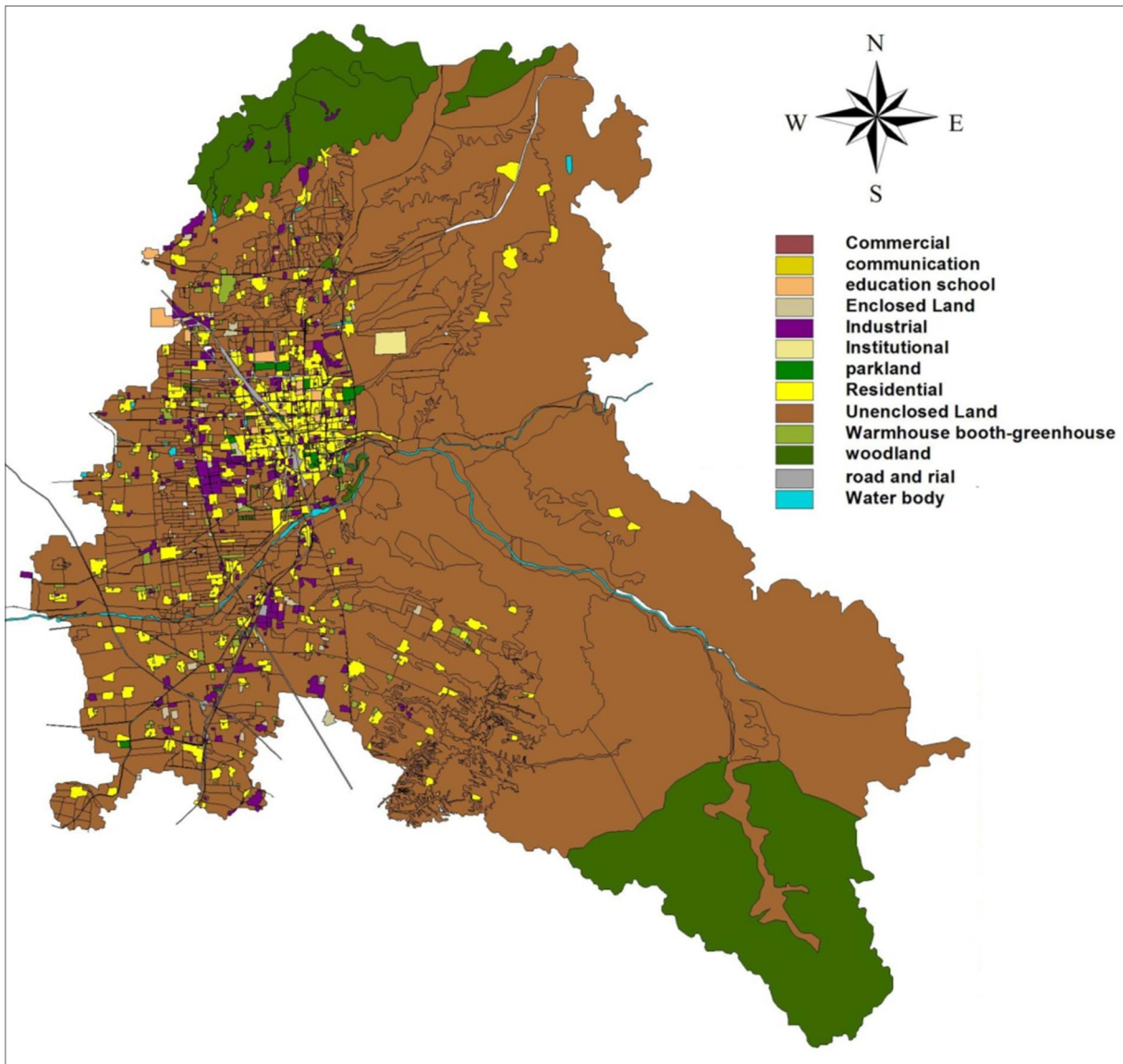
The land use map of Yuci (Map 5.3.1) is based on a master map to illustrate the context of land

use in Yuci, in China. In order to provide accurate information, the typology of land use differs slightly from the case of Sheffield. For example, the special land-uses include educational school and “warm house” (a greenhouse) booth which both have special functions in Yuci.

At the same time, the land use map cannot show land form, which affects the distribution of land uses and green spaces. For example, compared with Figure 5.3.1, the east area in Yuci is a large mountain and has few residential areas.

However, combined with Map 5.3.1, it can identify areas of human activities and their relationship to the natural areas of the city. For instance, residential land is mainly located in the inner urban area as the City Centre of Yuci. At the same time, the amount of residential area in the west and southwest area is larger than the east and north of the district. The context of industrial land is similar to the distribution of residential land.

As with the case study of Sheffield, this part of the study has established a green space baseline map for further analysis. As noted in the case of Yuci, educational schools and warm-houses are mapped as specific typologies, between these two types of land impact on the development of green spaces in Yuci. For example, the warm-house is a way of producing fresh agricultural products to get more economic benefits; hence, the extent of the warm-house has developed very fast and might totally change the land form and land use from natural area to man-made. On the other hand, in Yuci, there is a large area of agricultural land in the countryside and around the urban area.



Map 5.3.1: Yuci Land Use Map

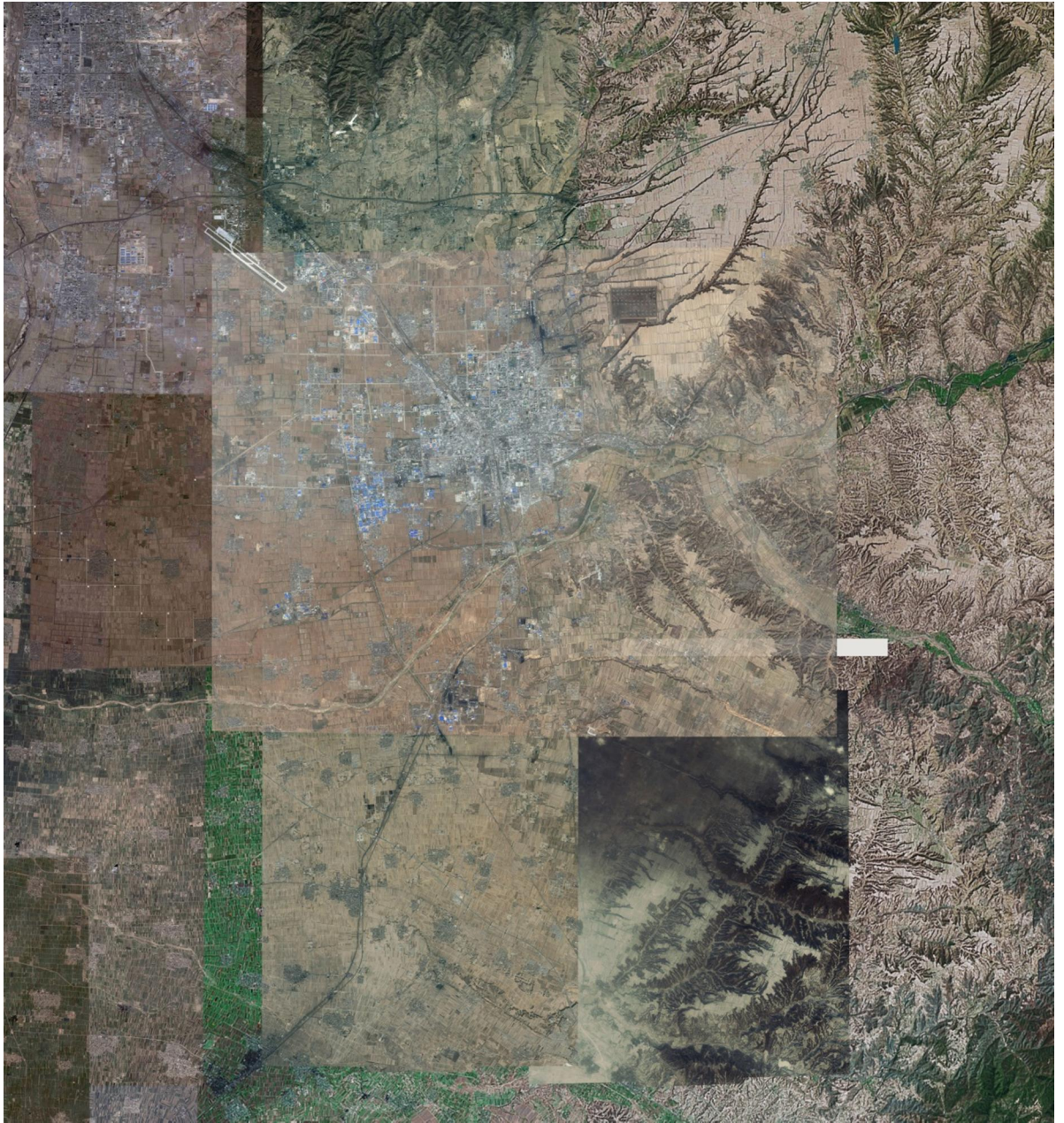
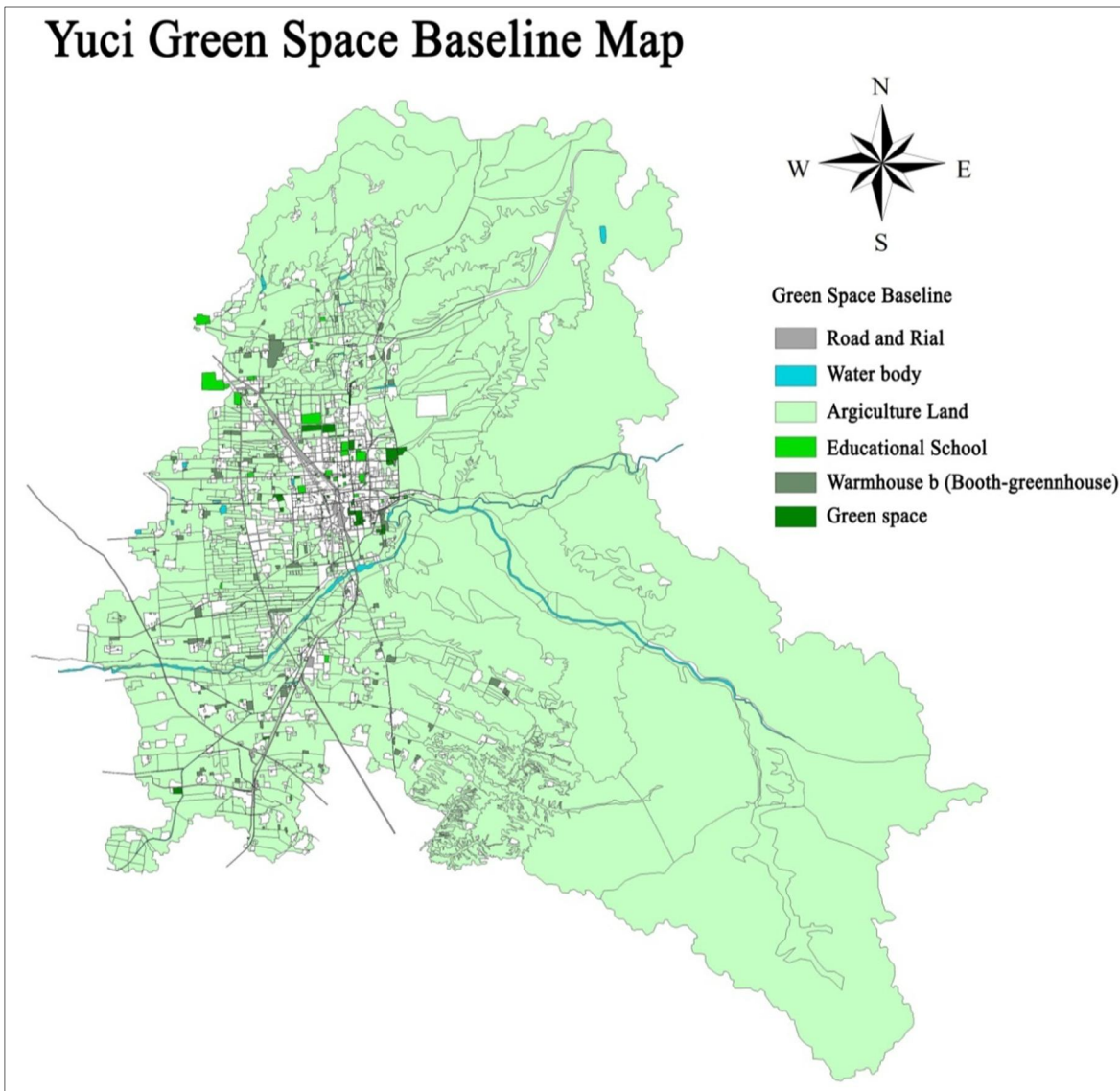


Figure 5.3.1: Airspace of Yuci (Source from: Google map)



Map 5.3.2: Yuci Green Infrastructure Baseline Map

5.3.1.2 Mapping the context of green spaces

As Map 5.3.3 shows, natural and semi-natural areas play a large and important role in the city. To the east of Yuci is a mountain area which is part of the loess plateau where there is much woodland. However, these spaces are not easily accessible and face some ecological issues, such as shortage of water resources.

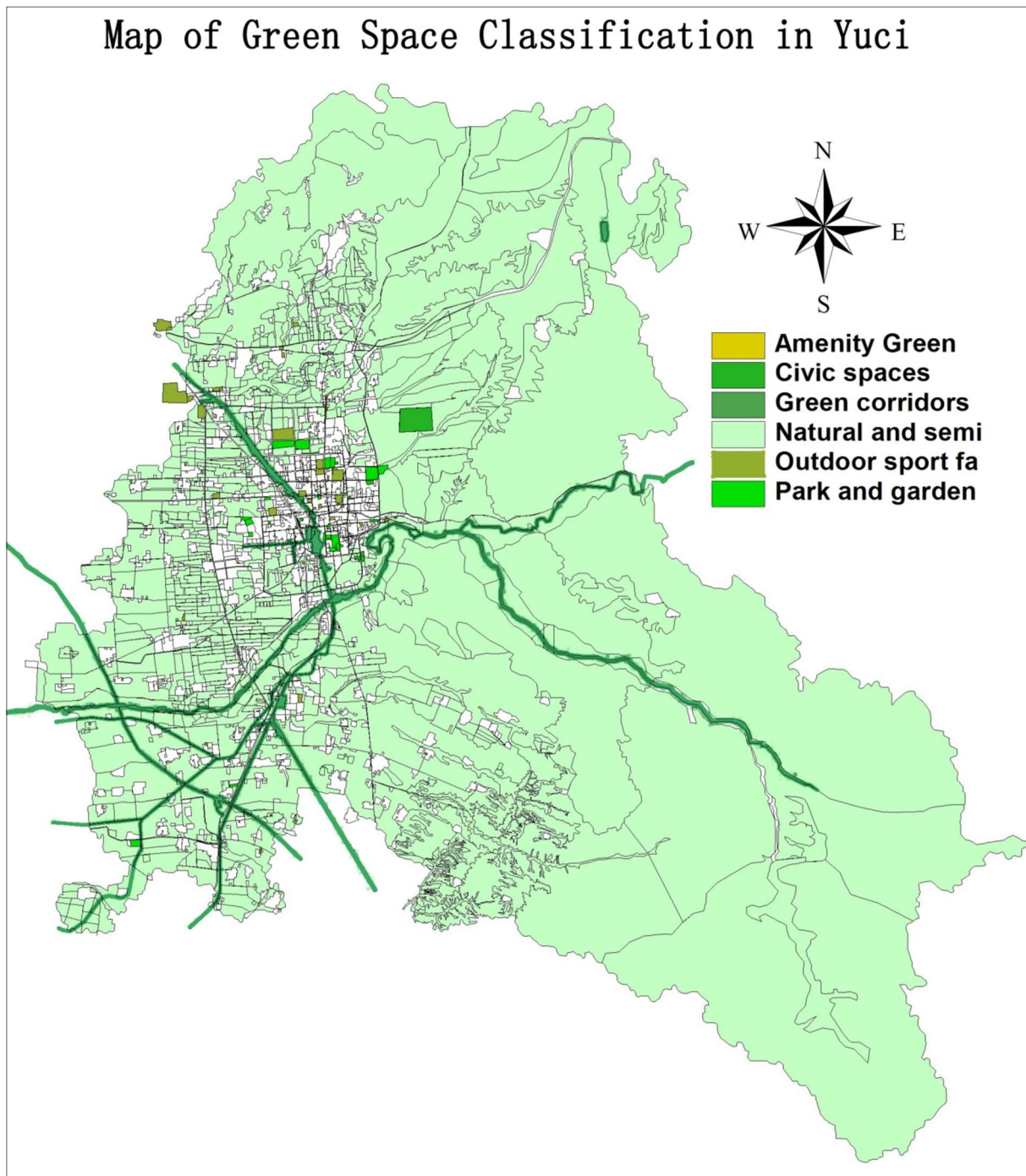
This map also reveals that there are fewer public spaces such as urban parks and community

gardens in the district and most of the spaces are located in the inner urban area.

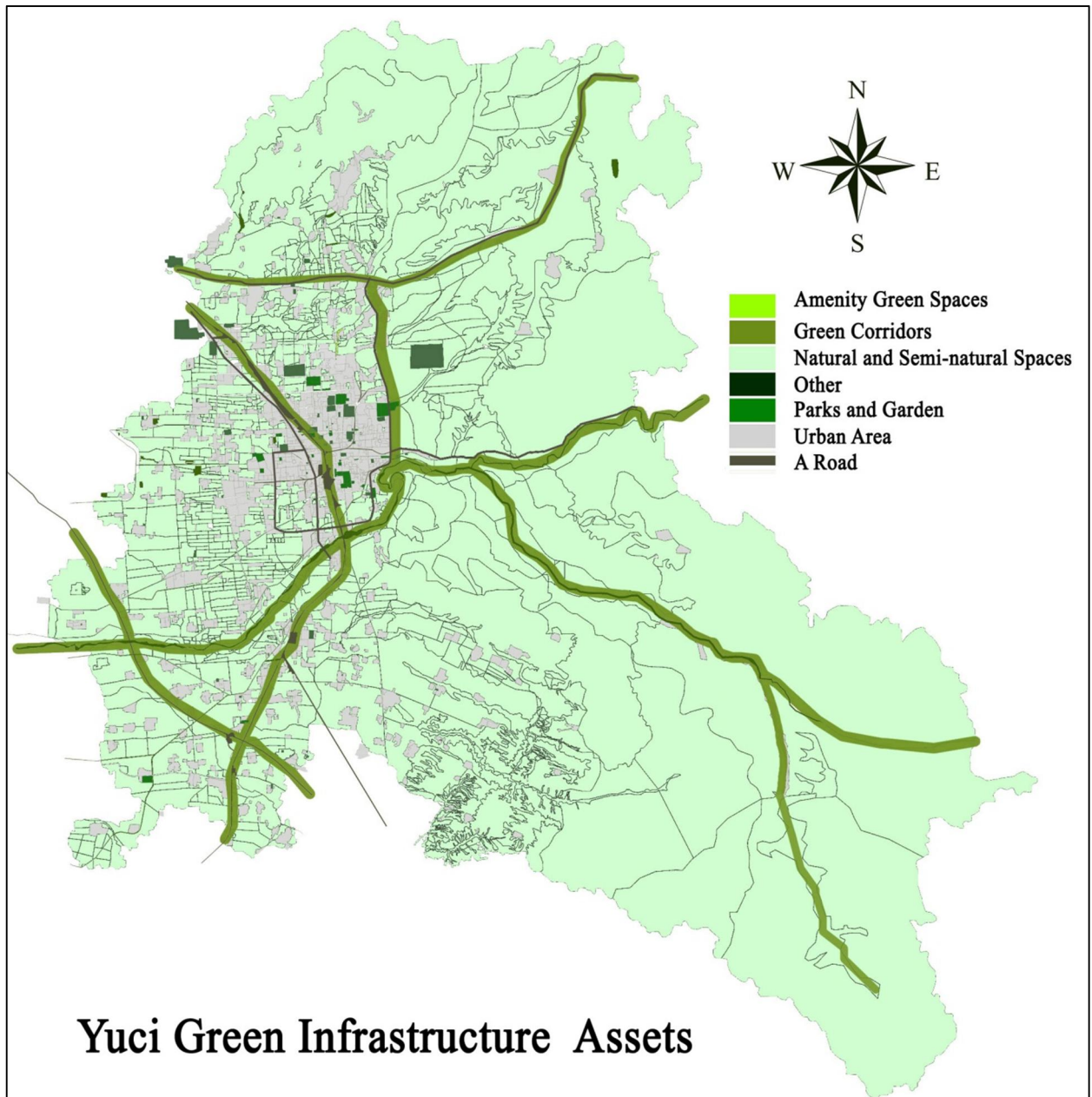
In this green space classification map, the main deficiency is that green spaces in residential blocks in the urban area cannot be mapped because of data limitations. According to this map, Green Corridors follow the river corridors, main road corridors and railway lines and cross the whole city. The development of green corridors as a green network is mainly based on the existing main road network and river corridors (Jinzhong City Government, 2009b). At the same time, the local authorities promote policies to increase the accessibility of visiting these corridors.

Moreover, the city of Yuci has a large amount of natural area in the countryside which includes agricultural land, mountains and woodland. These agricultural lands are deemed an important productive area which is managed by the Agricultural Bureau. In this case, these spaces are not normally open to public visitors and local authorities have no plans to support recreational development.

On the other hand, as map 5.3.3 shows, river corridors and transport networks combine together to link the countryside and urban area. Here it should be pointed out that not all river corridors contain running water and only the river bank. In China, city development policy requires that people are made aware of quality urban green spaces. Especially in recent years, the notion of the Garden City has become popular. Local government has to improve their quality in the urban environment. Therefore, the river canal as one type of urban park has been redeveloped for public use, at a high quality, across the city. For example, Xiaohe Wetland Park, one Riverbank Park and Wetland Park in Yuci, covers 78 hectares and has been developed since 2010. In 2011, the local government invested 90 million Chinese Yuan (almost 9.54 million pounds) for this development.



Map 5.3.3: Map of green spaces classification in Yuci



Map 5.3.4: Map of Green Infrastructure in Yuci

5.3.1.3 Green infrastructure condition in Yuci

Map 5.3.4 shows the general context of green infrastructure in Yuci. It identified that the green corridor is based on river and transport corridors. Although interviewees intimated that the local authorities of Yuci do not promote the concept of green infrastructure in their policies and documents, they have, since 2010, promoted three natural corridors across the city to improve the quality of urban environments in the Green Space System Plan of Jinzhong City. Map 5.3.4 shows that only a few parks and other green spaces exist in the urban area, and the green infrastructure in Yuci is mainly composed of natural and semi-natural green spaces and green corridors.

5.3.1.4 Quality and assessment of green infrastructure in Yuci

With the case study of Sheffield, this part also used the same considerations to determine the access barriers between green spaces and human activities. Similar indicators of service distance have been promoted by the central government in China. For example, normally, no person should live more than 500 meters from their nearest area of natural green space of at least one thousand square metres in size (MOHURD, 2010d). Moreover, no person should live more than 300 metres from an area of natural green space at least four hundred square metres. At the same time, the Shanxi Province Government also promotes that people should be able to walk to parks and green spaces within 300 metres, for parks and green spaces between 1000 -2000 square metres. Once the size of green space is over two thousand square metres, the walking distance should be no more than 500 metres (The Shanxi Provincial Government, 2010a).

As the Green Space System Plan (Jinzhong City Government, 2009b) proposed, the service radius of urban parks at city level should be between 1.5 km and 2 km; the service radius of green spaces at the community level (similar to “wards” in the UK) should be no more than 1 km and the service radius of green spaces at the neighbourhood level should be no more than

500 metres.

Therefore, based on the integrated standards in Sheffield and Yuci, 500 metres, appears to be a basic indicator of walking distance to determine the accessibility of green spaces.

As with the case study in Sheffield, the following indicators of distance buffers have been used:

Yellow: all accessible green spaces within 500 metres walking distance by visitors

Red: all accessible green spaces within 1 kilometre walking distance by visitors

Blue: all accessible green spaces within 1.5 kilometres walking distance by visitors

Purple: all accessible green spaces within 2 kilometres walking distance by visitors

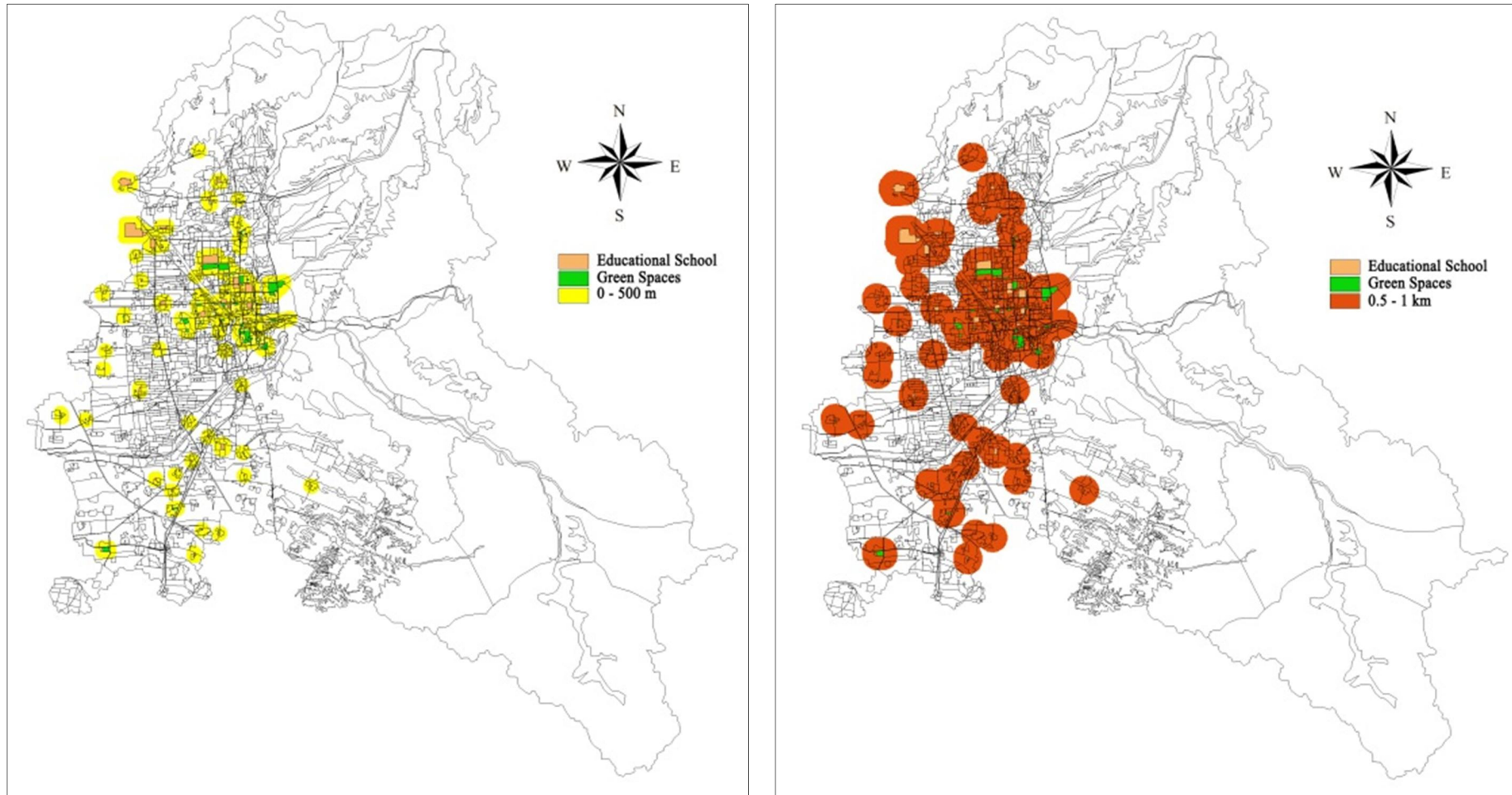
This mapping process has only mapped designed green spaces such as parks and gardens and outdoor sports facilities. It excluded river and transport corridors. Furthermore, the educational school as a specific type of green space (as part of outdoor facilities) is set out in these maps to illustrate the special nature of green spaces in Yuci.

According to the series of distance buffer maps (Map 5.3.5 and 5.3.6), the distribution of urban green spaces is extremely imbalanced in the region of Yuci when natural and semi-natural land such as agricultural lands are excluded. Map 5.3.7 overlaps different walking buffers (0-2 km) from urban green spaces. Most of the urban green spaces are located in the City Centre. In the countryside, the designed urban green spaces are mainly based on sports fields in schools in each residential areas. Without this, there are no designed public green spaces in each valley and settlements in the countryside areas.

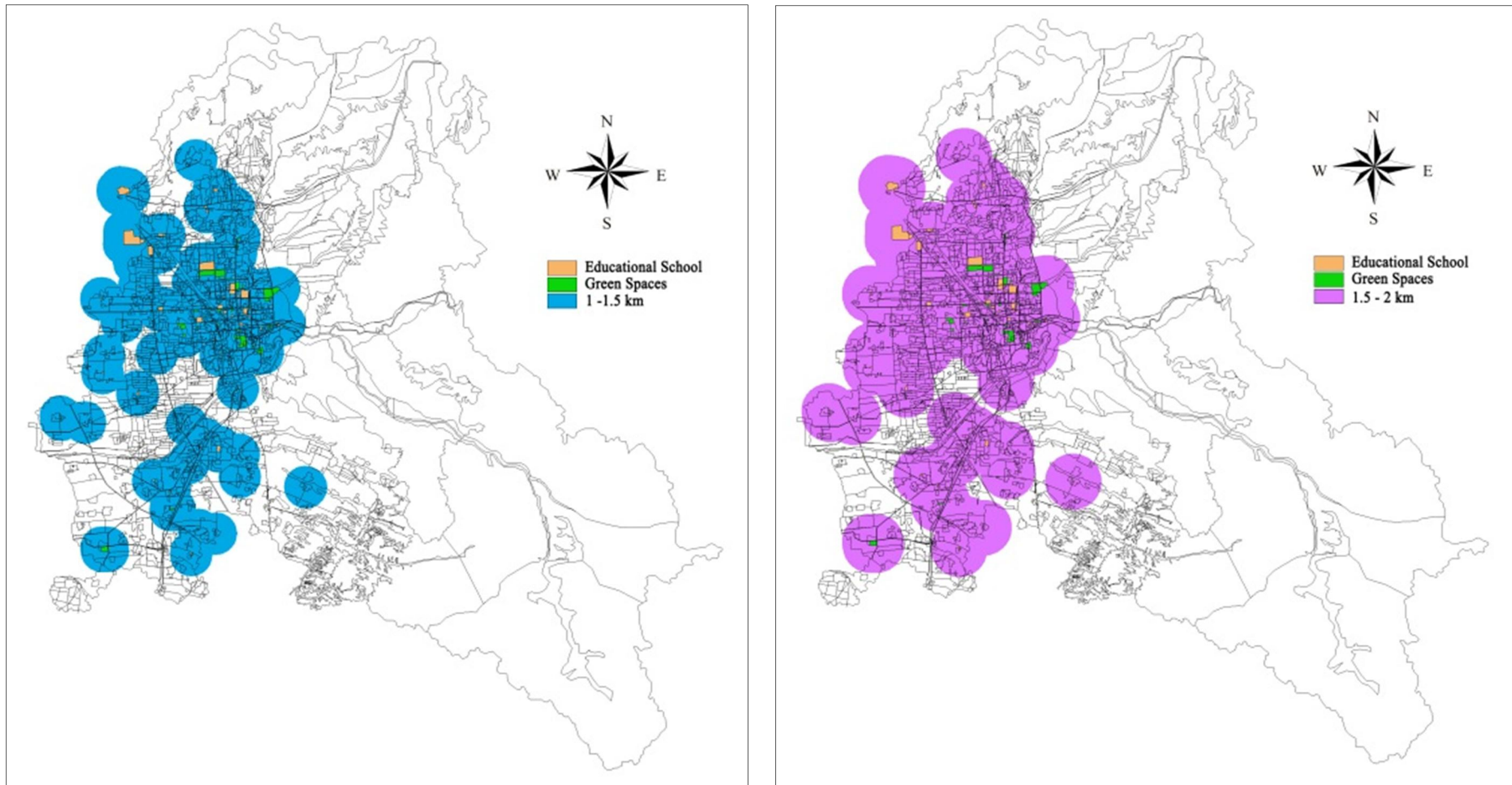
According to these maps, there are obvious gaps for people's access to urban green space. Especially in the inner urban area, local residents are facing a shortage of urban green spaces within 500 metres walking distance. Of course, this does not include enclosed residential green spaces which are not open for the public and can only be accessed by residents.

Nevertheless, the mapped urban green spaces include school fields which are normally only open to students and not open to the public. Therefore, some obvious issues of urban green space in the city can be learned from these maps. As one interviewee mentioned, the lack of urban green spaces in the inner urban area is a problem left over by history. It is difficult to find in an increasingly built up area.

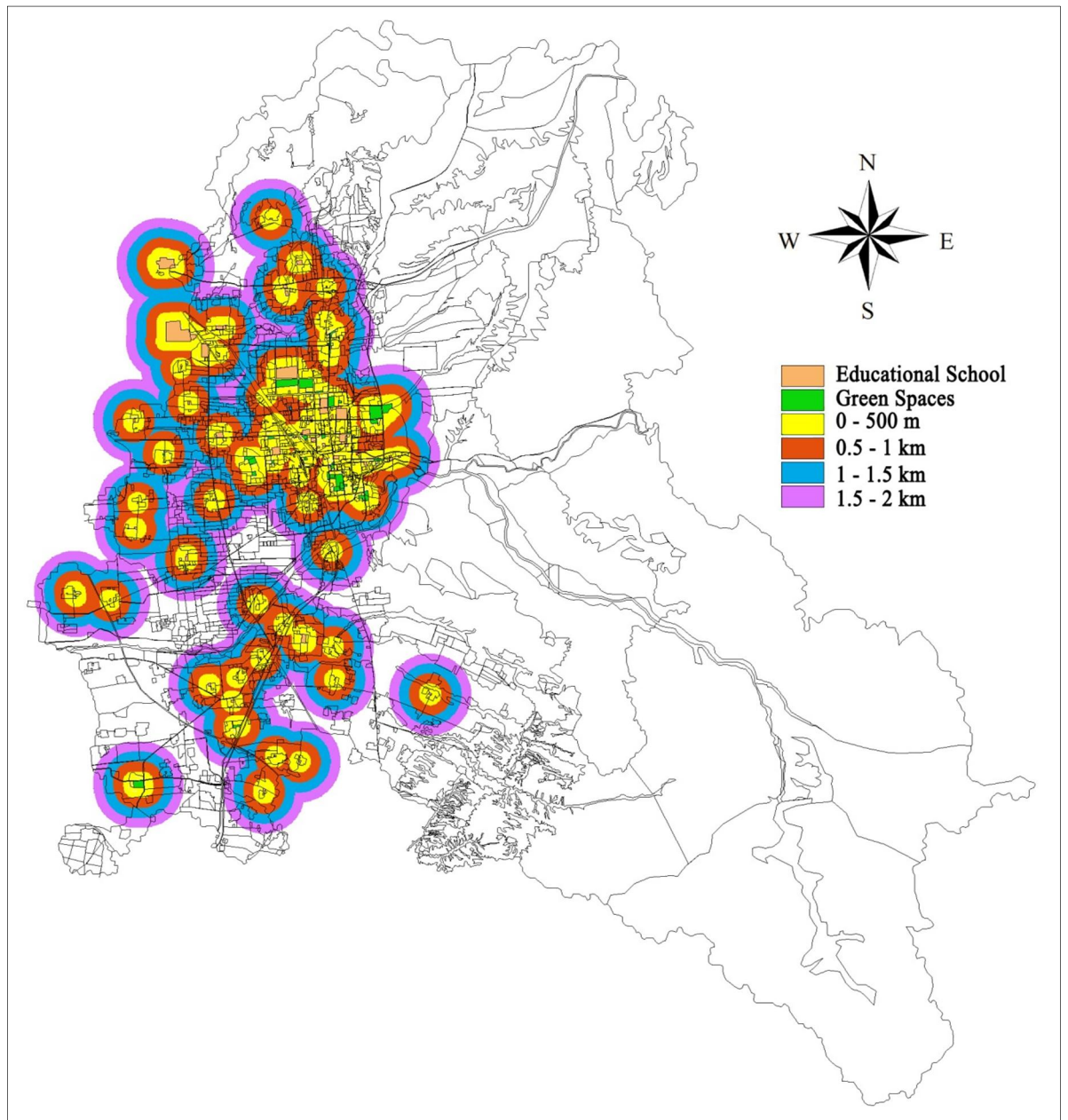
Map 5.3.8 shows the relationship between population and green spaces. The inner urban area is a high population density area, whereas population is significantly lower in the countryside. However, the overall per capita green rate in Yuci is considered to be satisfactory. This is because most of the new improved urban green spaces surround the urban area and are located in the urban fringe, like Jin Shang Park and Xiaohe Wetland Park.



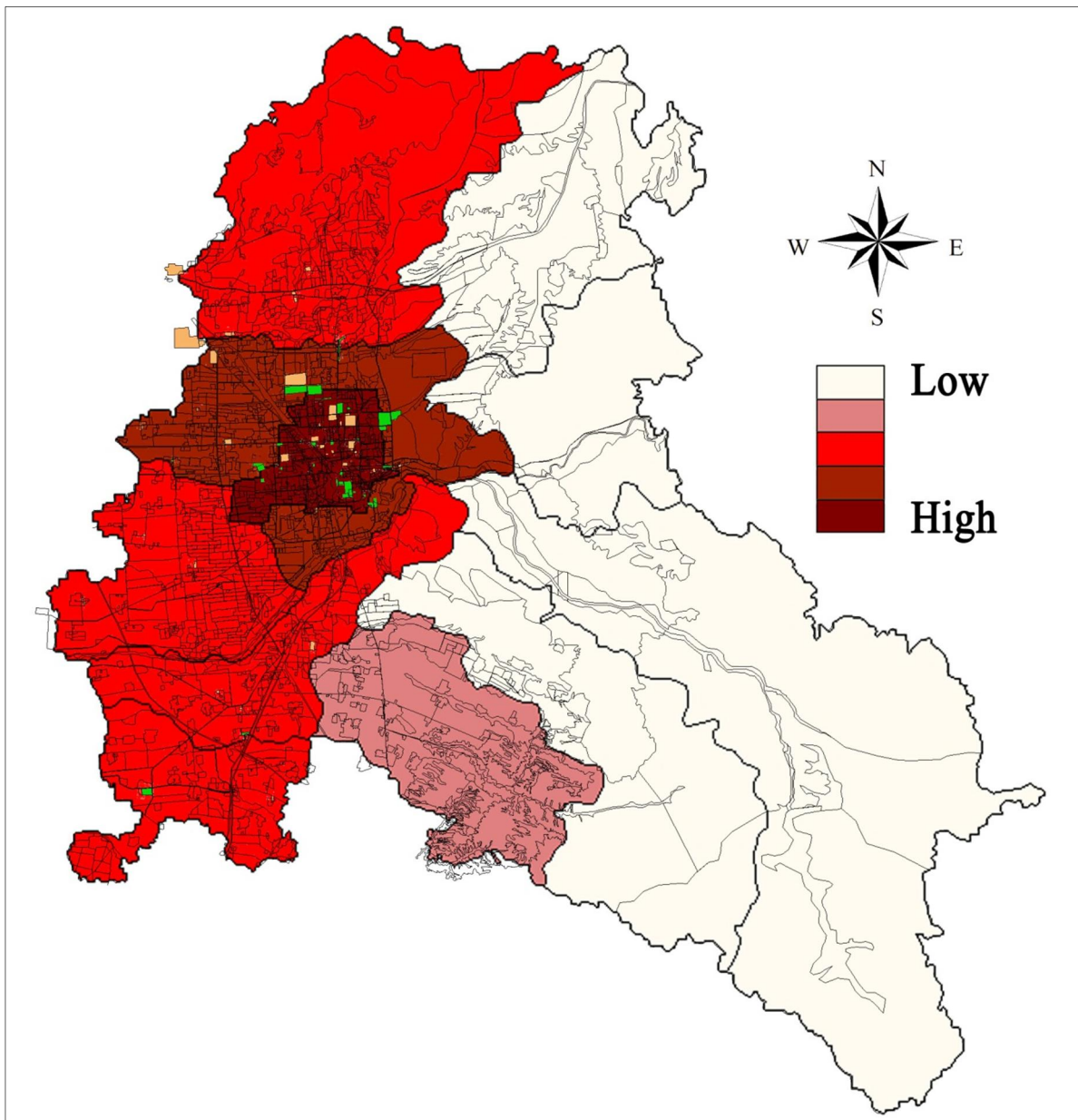
Map 5.3.5: 500 m and 1 km distance buffer map of existing urban green spaces in Yuci



Map 5.3.6: 1.5 km and 2 km distance buffer map of existing urban green spaces in Yuci



Map 5.3.7: Distance buffer map of existing urban green spaces in Yuci



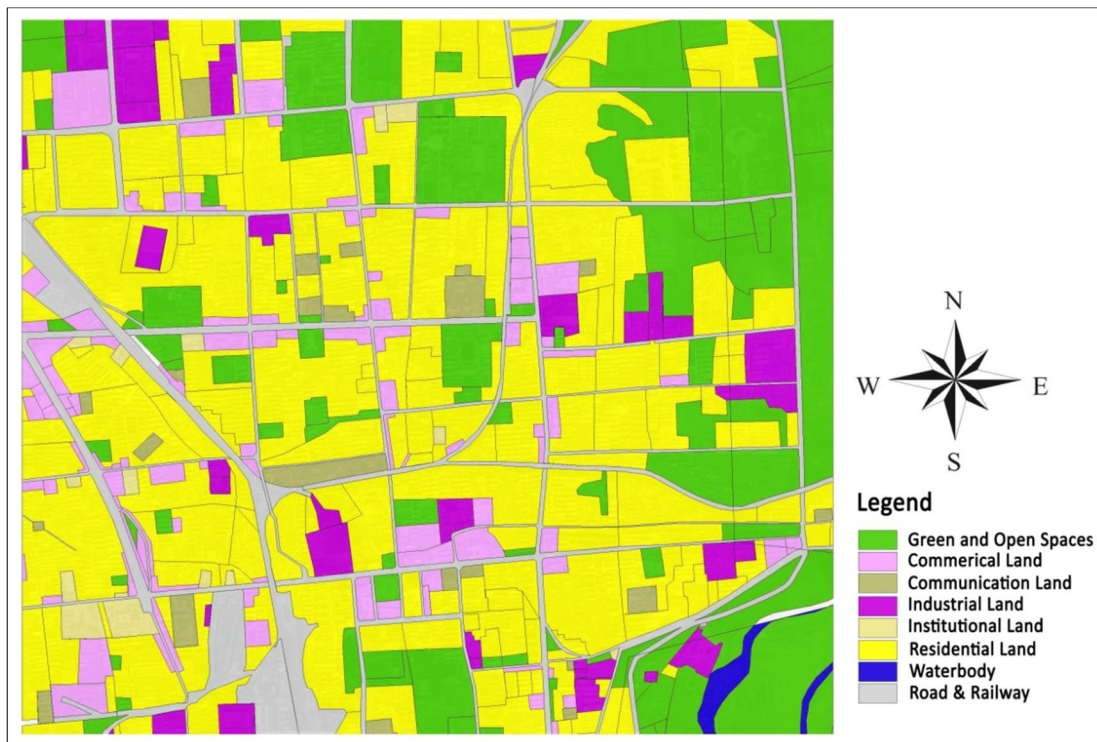
Map 5.3.8: Map of population superimposed on existing green spaces in Yuci

5.3.1.5 5000m x 5000m block example (Yuci)

Similar to the case in Sheffield, this 5000m x 5000m block case study is selected at the centre area in Yuci, where there are various land uses and a number of urban green spaces. This case presents a detailed context of accessible urban green spaces in the central area in Yuci. As map

5.3.9 shows, the central area of Yuci contains a large number of residential areas and some industrial lands interspersed in this area. Further, this studied block only contains a few types of urban green spaces, such as park and garden, outdoor sports facilities and civic spaces. In the studied block, there are also some natural and semi-natural urban green spaces which are undeveloped areas and agricultural lands. Figure 5.3.2 shows the total count of urban green spaces in the studied block. As Figure 5.3.2 shows, there is a large number of natural and semi-natural green spaces in the block and parks and gardens are the main accessible urban green spaces in the block.

Map 5.3.10 represents 300 metre walking distance to access urban green spaces in this studied block. As Map 5.3.10 shows, there are many gaps in the 300 metre walking distances from urban green spaces in the central area. Many residential areas lack access to urban green spaces. Further, combined with Map 5.3.11, the value of urban green space accessibility in the block is average. In the 300 metre buffer, there is not specific good accessibility and high density of urban green space distribution. Generally, this block has some clear gaps of accessibility of urban green space in the residential area, with an average value of accessibility in the 300 metres buffer area.



Map 5.3.9: Map of land use on 5000m x 5000m block in Yuci

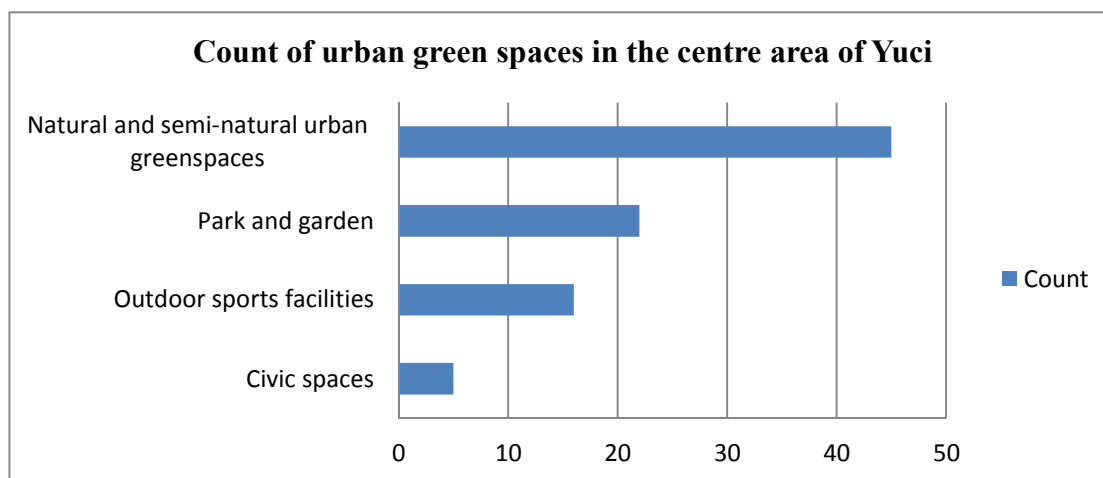
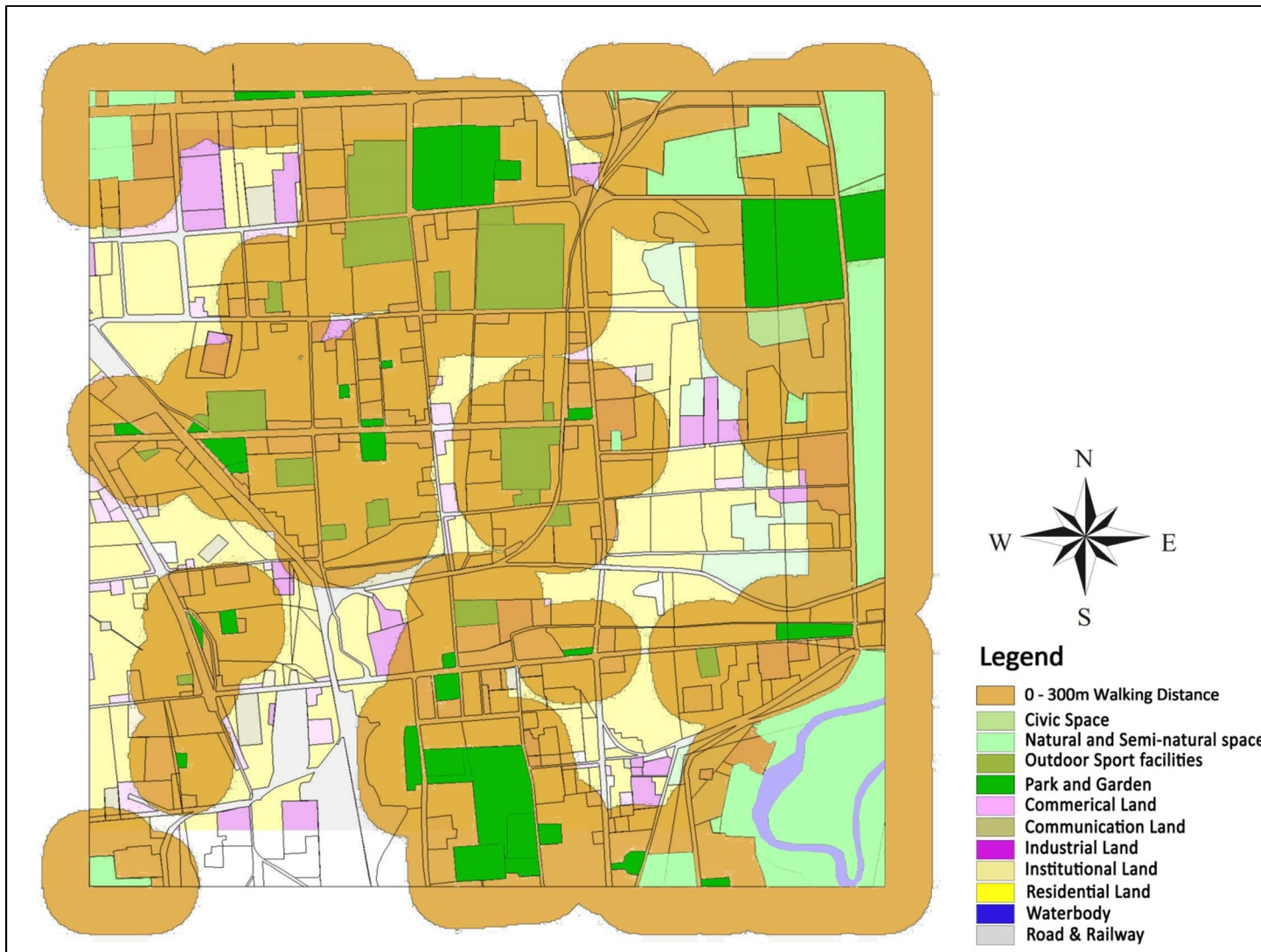
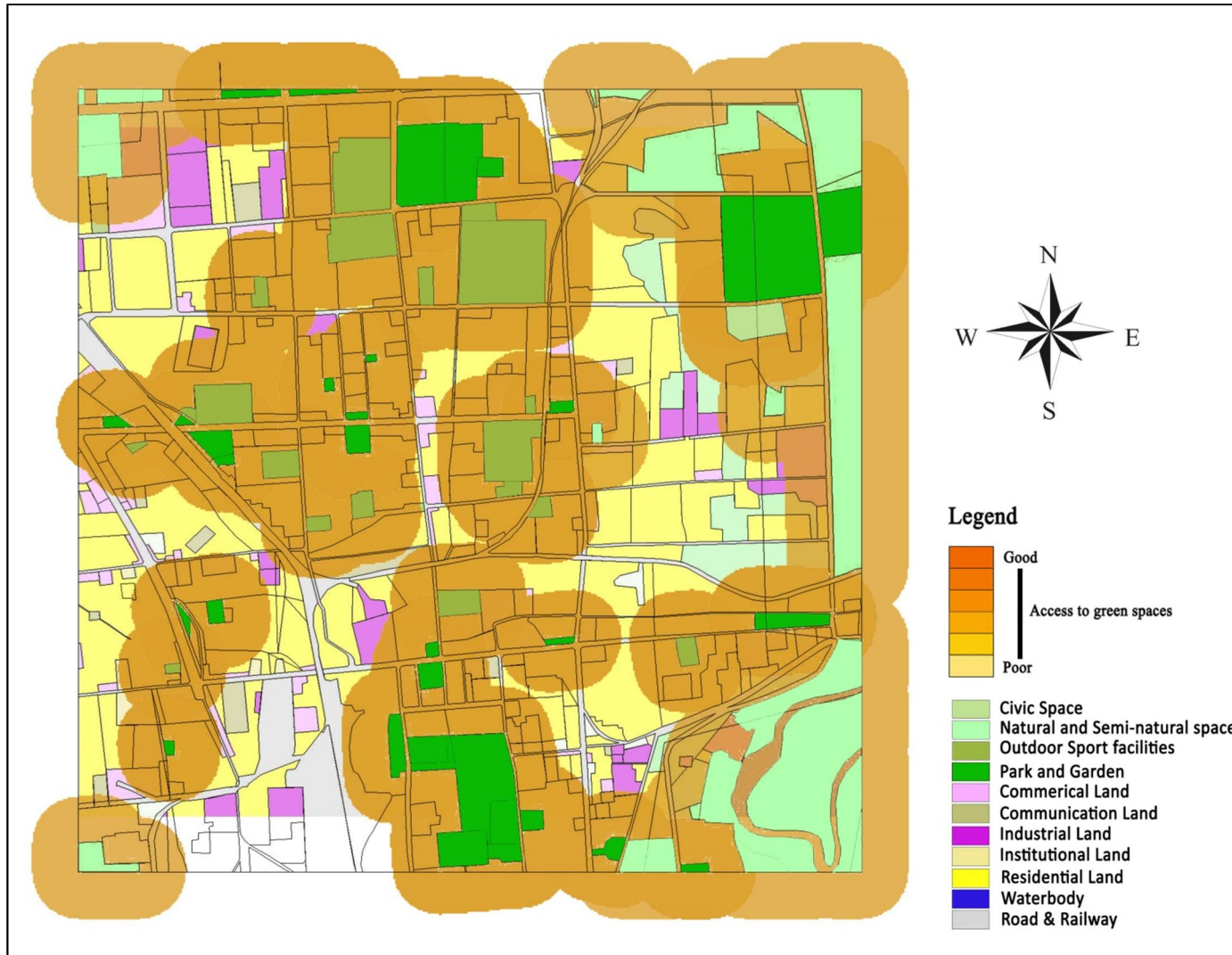


Figure 5.3.2: Count of urban green spaces in the Centre area of Yuci



Map 5.3.10: 300 meter walking buffer map for 5000m x 5000m block in Yuci



Map 5.3.11: Accessibility for walking to different types of green spaces in 300 m distance for 5000 m x 5000 m block in Yuci

5.3.2 Management arrangement for green infrastructure in Yuci

5.3.2.1 Structure of local government

In the city of Yuci, the Jinzhong Landscape Department is responsible for management of urban green spaces in the whole Jinzhong city region (including twelve districts and towns) and also specifically manages the landscape spaces (including green spaces and hard landscape sites) in Yuci urban area. In addition, its work includes long term management, arrangement of plans and designs, and daily maintenance for urban green spaces in Yuci.

In Yuci, many different departments cooperate to manage their urban green spaces. For example, Figure 5.3.3 shows where these departments are responsible for management within the boundary. The local landscape department generally works on urban areas and also is responsible for organising activities, making plans, management and maintenance.

In the countryside, there is a complex management situation. For example, the Land and Resources Department is responsible for management of the countryside which includes agricultural land, undeveloped land and other natural land and works to ensure a certain amount of agricultural land. Also, the Forest Department is responsible for management of woodlands and forests which include natural and forest parks in this city. In addition, some places of historic and scenic interest are managed by the Travel Bureau and Cultural Relics Bureau which are responsible for regular management and maintenance in these spaces.

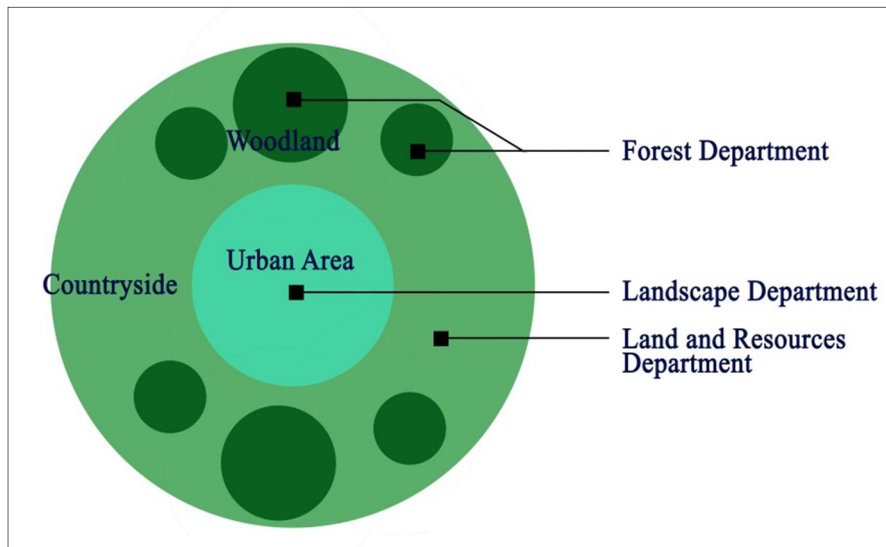


Figure 5.3.3: Responsibility of green space management in Yuci region

Figure 5.3.3 illustrates the structure of landscape responsibilities in Jinzhong. It only shows direct management responsibility for the physical area. However, during the process of management, more departments and groups are involved in different stages. For example, the interviewee described that *“The related departments, are... The first is Planning Department, second is Housing and the Urban-Rural Construction Bureau (department), and third is financial department... fourth, forest department is related sometimes... fifth actually is Yuci Local District Council ...”* (Deputy Director of Jinzhong Landscape Department)

The interviewee also recognised the role of the Landscape Department in the following terms:

“The department’s role has some major functions which are ruled by the Establishment Committee (higher government). The major function mainly lies in implementing national, provincial, and city policies which include landscape, greening strategies, principles and policies, laws and regulations. At the same time, the department organises and implements the drafting of the normative documents about landscape management for the whole city.” (Deputy Director of Jinzhong Landscape Department)

Moreover, the department also has the right to manage and monitor the “Green Stamp” that is,

“manage the green lines in the city, such as green lines of road (vegetated road boundaries), green lines of parks, water, and residential areas” (Deputy Director of Jinzhong Landscape Department).

A major function of the Landscape Department in Jinzhong is examining and endorsing the landscape and green plans in the development of residential sites and institutional areas. For example, *“for residential sites, we have a regulation to request the percentage of green space in newly built residential sites or institutional sites, so that the rate of green space achieves at least thirty five percent, and in conservation areas must achieve over twenty five percent. Only then can the greening plan gain permission from our landscape department in conjunction with the planning department.”* (Deputy Director of Jinzhong Landscape Department)

At the same time, the department also organises and implements some key projects in Jinzhong region, which includes Yuci District. For instance, there is the Five-Year-Plan in China that is used to achieve the local government’s vision. Once the plan has included a schedule to develop new urban green spaces such as new parks, the department will be responsible for achieving the vision. The process includes organising competition, management of projects, and final acceptance.

Figure 5.3.4 illustrates the organisation of the Department of Landscape in local government. As shown, the Landscape Department contains six sections: General Office, Finance Section, Personnel Office, Planning and Design Office, Construction and Management Office (responsible for constructing and managing new green spaces), and Supervisory Section. It also has three subordinate units (or institutions) directly under the department: Park Management Unit, Traffic Greening Management Office (Unit) and Flower and Nursery Centre.

Table 5.3.2 shows the responsibility of each part in the Landscape Department of Jinzhong. General Office, Finance Section and Personnel Office are three conventional offices in Chinese government sectors and provide services for other sections in the department. The

other three offices are considered as professional sections with specific functions such as responsibility for policy-making (Planning and Design Office), building and management of green spaces (Construction and Management Office), and monitoring (Supervisory Section).

Moreover, three units also manage specific types of green spaces in the urban area in Yuci. For example, the Park Management Unit is responsible for management and maintenance of urban parks in the inner urban area. Traffic green spaces such as street trees are managed by the Traffic Greening Management Office (Unit). The responsibility of the Flower and Nursery Centre is to prepare seeds, wild flowers and potted flowers to decorate the city. It also has space to plant flowers for sale and rental.

In summary, the Jinzhong Landscape Department plays an important role to manage parks and green spaces in Yuci's urban area. At the same time, the management of urban green spaces is also co-managed with other relevant departments. In Yuci, specific types of urban green spaces are managed by various government departments. In some spaces, management groups overlap and have separated responsibility.

On the other hand, compared with management groups from Sheffield, most of the urban green spaces are owned and managed by local government in Yuci. There are few communities and partnerships involved in the management process. Even the daily maintenance of urban green space across the whole urban area is organised and run by the related department from the local council.

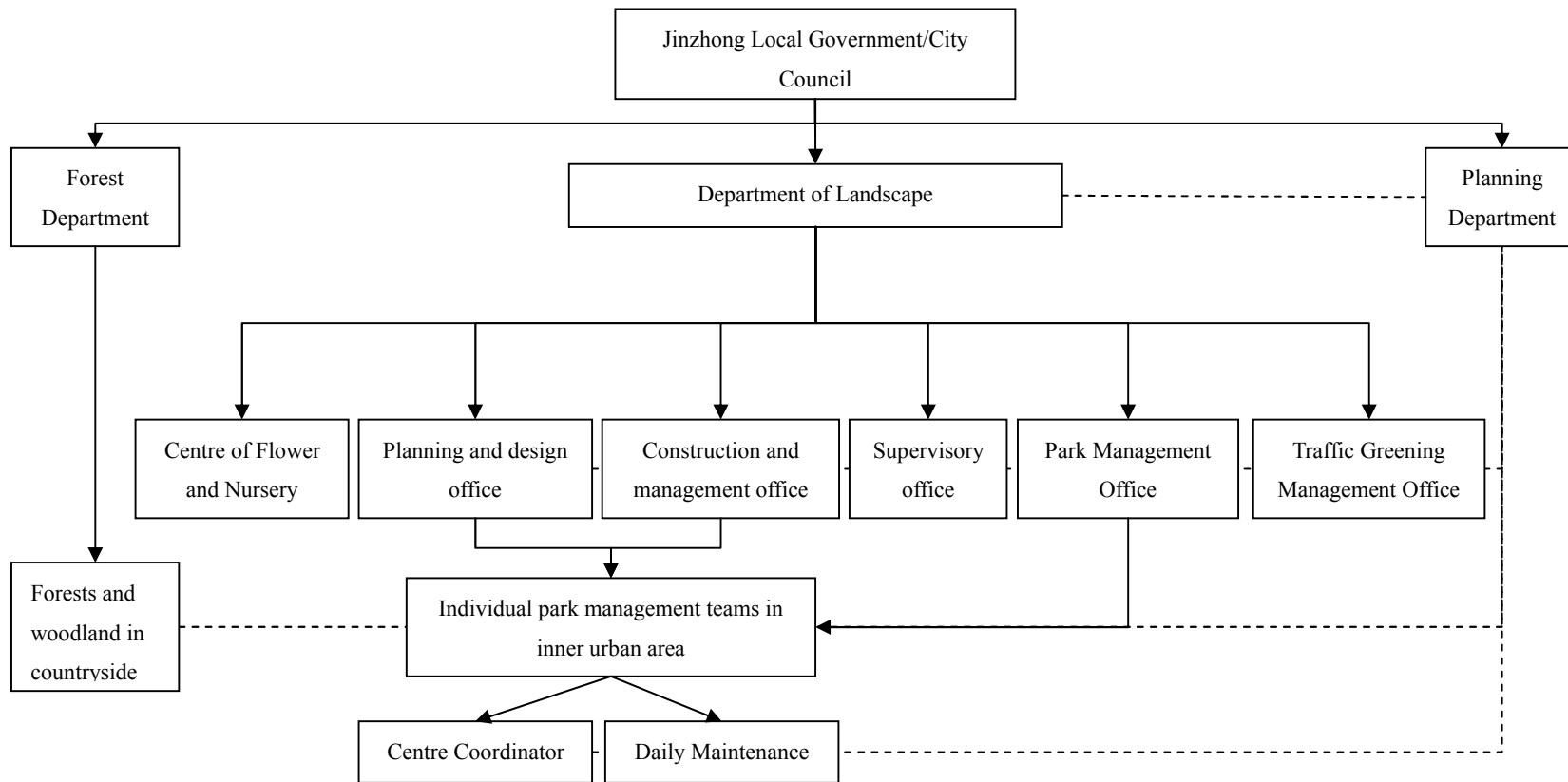


Figure 5.3.4: Organization of the Department of Landscape in Yuci local government

01	General office
	- Responsible for internal and foreign, applications, and drafting of documents
	- Arrangements for day-to-day logistics, including management of vehicles, environment and health, arranging meetings, reception, office supplies
02	Finance section
	- Responsible for the preparation and reporting of the department's financial income and expenditure; funding and final accounts
	- Annual budget
	- Payment of salary
03	Personnel office:
	- Recruitment of staff, management of personnel
	- Personnel in charge of the entire staff, labour, technical qualification, training, personnel training
04	Planning and design office:
	- Co-operate with planning department to organize plans and strategies to develop green spaces in the urban area
	- Responsible for examining landscape greening projects, identifying urban green lines and implementing 'green stamp' to strengthen urban greening;
	- Responsible for makes drafting urban greening regulatory documents, examining construction greening projects, examining alternative greening rules and attribute of green land in urban area;
05	Construction and management office
	- Responsible for making, implementing and monitoring the annual plan;
	- Examining business and service projects in public green spaces;
	- Responsible for making greening maintenance standards and local regulations in Jinzhong city;
	- Responsible for examining greening projects from establishment units;
	- Checking landscape and greening companies, qualifications in Jinzhong;
	- Organize competitions in landscape, parks and green spaces;
	- Responsible for landscape project supervision and project examination and checking;
	- Responsible for improving the impact of green spaces
	- Making standards for parks and organizing assessment and checking new parks in urban area;
	- To survey and conserve ancient woods
	- To examine insect pests and disease control;
06	Supervisory office
	- Responsibility for examining greening management standards and regulations;
	- Monitors, guides and coordinates enforcement works from landscape supervisory team in the city
	- Responsible for examining any illegal actions in green spaces;
	- The right to coordinate each authority to improve the quality of green spaces in the city.

Three subordinate units (or institutions) directly under the department	
01	Park Management Office
	- A sub-group in the department. Its responsibility is the management urban parks, gardens and public squares. It also undertakes flower cultivation and maintenance.
	- Checks/examines and evaluates every park's productive tasks;
	- Takes charge of safety and maintenance in entertainment facilities.
02	Traffic Greening Management Office
	- Maintain all street green spaces and flowers
	- Responsible for truck safety and maintenance of landscape mechanising
03	Centre of Flower and Nursery
	- Responsibility collect, breed store and supply flowers for city.

5.3.2.2 Local policy context

- Review of development of Green Space policy in Yuci

In Shanxi province, Shanxi Province Government promulgates the regional documents. All these documents are based on national documents and guide their sub-governments in Shanxi province. The documents in Jinzhong region are promulgated by Jinzhong city government. They are intended to guide their landscaping and greening work in Jinzhong City. However, the study area is Yuci District which is the Central district of Jinzhong. Hence, only part of the local documents are specifically directed at Yuci. These documents at the local level also include some annual reports and working frameworks which are related to landscape and green spaces in Yuci.

Similar to the Green and Open Space Strategy in Sheffield, the Green Space System Plan of Jinzhong City is important for developing and managing parks and green spaces in Yuci. It is written by Shanxi Urban and Rural Planning and Design Institution and is a ten-year plan. The time scale is the same as the master plan for Jinzhong city. This plan was published in 2009 and covered the whole Yuci District area (including countryside and urban area), and divided into two parts: the first part includes proposals and plans for the development of urban green spaces in the whole district area, and the second part concentrates on the inner urban area. Normally, the Green Space System Plan functions to identify quantity and quality of green

spaces in the planning area, to make long term plans for achieving the vision of the local department, such as its aims for ecological conservation, recreation and leisure, and social activities.

The Green Space System Plan provides a long term vision to establish systemic green spaces and improved quality in Yuci District, and especially focused on quantity of designed green spaces. For example, it plans that urban parks should reach 528 hectares in 2015 and 735 hectares in 2020. It also aims to establish a green space network in the Yuci District (Figure 5.3.5) which contains an urban circle surrounding an inner urban area, two woodland parks as natural biodiversity sources, four natural scenic spots and multi-corridors such as river corridors, and a flood control reservoir (Jinzhong City Government, 2009b).

The plan proposed a series of proposals and targets for particular green space types (the types of green spaces based on the classification of urban green space in China, Table 2.2.3), such as policies for Green Corridor (river, urban green, circle), Parks and Open Spaces, Allotments and Community Green (productive plantation area), Green Buffer (transport green, civil green) and Attached Green Space (residential and business green spaces). However, the Green System Plan is mainly focused on increasing the amount of urban green spaces in the urban area and does not mention the concept of green infrastructure.

Moreover, green spaces for disaster prevention are specifically designed through the plan which aims to ensure the safety of life and property from earthquake, flooding and other natural calamities for people in the city. According to the plan, planned urban green spaces have to provide spaces and the ability to ensure that people can easily access these spaces, in the event of a disaster.

Besides, species of vegetation and trees for urban greening are also clearly identified and proposed in this plan, such as a proposal for planting tree species, and conservation of biodiversity, conservation of ancient and famous trees.

As with Sheffield’s Green and Open Space Strategy, the Green Space System Plan in Yuci also has a short-term action plan which schedules landscape projects and actions for the following year in the inner urban area. Based on these actions in the plan, local authorities have promoted a series of projects to develop new parks and green spaces.

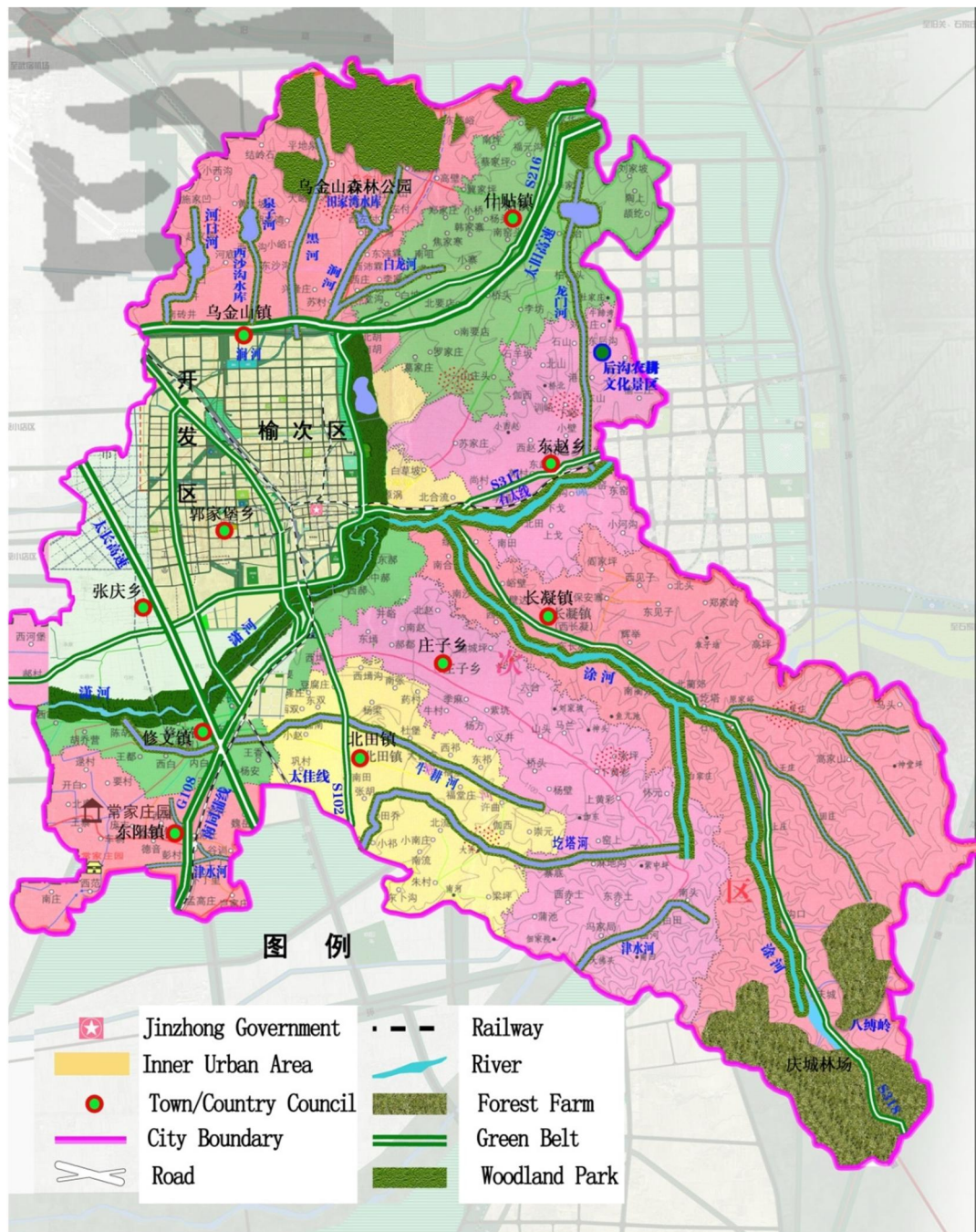


Figure 5.3.5: Proposal Map of Green Space System in Yuci District
 (Source: the Green Space System Plan of Jinzhong, Jinzhong City Government, 2009b)

- Changes in urban green spaces in Yuci (National, Regional, City and District)

Furthermore, the development of urban green spaces is also influenced by political decisions from local and higher authorities. For instance, since 2010, Yuci local government has strived to achieve the National Garden City Award (see Chapter Two). In order to apply the National Garden City Award, the local government has to reach certain conditions before submitting their application. In this situation, the city must have established a GIS database, produced a Green Space System Plan, already gained the second level of urban green space classification, and achieved the Provincial Garden City (Town) Award for two years.

Therefore, the Jinzhong City Government was the first to apply for the Provincial Garden City (Town) Award, which is similar to the National Garden City Award. In this respect, the local government promotes a series of actions and bylaws for improved urban green spaces between 2008 and 2010. There are “The Details of Target Responsibility and Evaluation System for Achieving Garden City Award in Jinzhong” (Jinzhong City Government, 2008), “Framework of Achieving National Garden City Award in Jinzhong” (Jinzhong City Government, 2009a) and “Garden and Green Spaces’ Management, Maintenance and Conservation Assessment Method” (Jinzhong City Government, 2010).

According to these documents and bylaws, the local government funds and supports a series of projects for the development of urban green spaces, such as Jinzhong Sports Park, Xiaohe Wetland Park and Jinshang Park which are all built in the last three years with huge investment. The amount of urban green spaces obviously increased during recent years. For example, there were 49 landscape projects started in the city and about 1.5 million square metres of green spaces during the first half of 2010 (Landscape Department of Jinzhong, 2010).

In addition, the Shanxi Province Government has proposed the “Star Parks Criteria” and “Award of Landscape (Garden)” for institutional, residential and road green spaces to improve

and evaluate urban parks and other designed green spaces within the Shanxi region. These evaluations encourage local authorities to make more investment to develop their green spaces.

For example, the Standard of Star Park was intended to measure the quality of parks at five levels on site. According to requirements in this standard, any park for which an application is submitted should have been open to the public over one year and already have a management group set up. The responsibility is on local managers and authorities to achieve the standard.

The Criteria of Urban (town) Star Park comprises six elements, whose scores are total to 1000 points. The section of planning and management comprises 100 points; the section on greening landscape management, 250 points; the section of health environment, 200 points; basic infrastructure (civic or construction infrastructure), 200 points; marketing management, 150 points; and security, 100 points. Some parks in towns can be evaluated against an 850 point total, if they are not marketed.

5.3.2.3 Monitoring and assessment of management in Yuci

(1) In management procedures

Landscape management is regularly measured and monitored at local departmental level. The Landscape Department of Jinzhong has a supervisory office to measure and monitor the condition and management process of landscape in Yuci District. Also, each office and unit in the department has self-measure schemes to monitor their own work. For example, the Park Management Office is responsible for daily maintenance and management of public parks and open spaces.

For some specific purposes, the measurement teams are usually made up by different groups. For instance, auditing the National Garden City (Town) Award is organised by higher

authorities (like Shanxi Province Government) who are responsible for the composition of the monitoring.

On the other hand, review of Star Park is measured every three years to check condition of named Star Parks. If these parks do not retain their quality as requested by Star Park Standards, the Award of Star Park will be cancelled. This monitoring also includes two indexes which have detailed contents and standards of valuation (scoring system).

For daily management and maintenance on site, local department and managers have staff to work on. These staff work to maintain cleaning, plants and facilities. However, they do not have specific action plans and only have general visions for guiding staff, such as keeping clear, ensure plants flowing.

(2) In plans and policies

Monitoring and measurement of managed urban green spaces have also been considered in different government documents and bylaws for achieving specific visions. Figure 5.3.6 shows the structure of the measurement and monitoring processes which are set by government documents and bylaws at different levels in Yuci.

Monitoring and measurement for the National Garden City Award is organised by the Ministry of Housing and Urban-rural Development of P. R. China (MOHURD) in the Central Government of China. In the Application and Criteria Method for National Garden City (MOHURD, 2010a), the professional measurement team evaluates the application in four steps (see Figure 5.3.6) and holds the process every two years: even-numbered year for application and odd-numbered year for examination and evaluation. Once the city gains this Award, measurement and monitoring will be held every five years by the provincial government and random checks will be carried out by the related ministry from central government. Similar to the measurement and monitoring of the National Garden City, the Provincial Garden City (Town) has the procedure, governed by the Application and Criteria

Method for Shanxi Provincial Garden City (Town) (The Shanxi Provincial Government, 2010a).

Furthermore, the monitoring and measurement process for Provincial Stars Parks and Landscape (Garden) institutional, residential and road green spaces are set out in their own official documents by Shanxi Province Government and run by the Department of Housing and Urban-Rural Development of Shanxi Province (DOHURD). For instance, DOHURD has organised an expert group to examine the application and monitor the winner every three years (The Shanxi Provincial Government, 2010b).

At the city level, the Garden and Green space's Management, Maintenance and Conservation Assessment Method (Jinzhong City Government, 2010) is used to guide the audit of greening and maintenance of urban green spaces by local authorities in urban areas in Yuci. The Landscape Department of Jinzhong arranges an audit team. The head of this team is the head of the department and other members are representatives from each office and unit.

According to the assessment method, the audit team is responsible for examining daily maintenance, healthy environment, security and social evaluation and management of documents. The examination should be held each month and includes field surveys and scoring.

Although, these practices in Yuci do not mention multifunctional green infrastructure, they have been promoted to bring benefits and improve the quality of urban environment for better living environment. The monitoring interests in Yuci therefore, are focused on quality of maintenance.

To sum up, the local department has a series of programmes for the monitoring and measurement of landscape in Yuci. The monitoring and measurement process also has a schedule which is implemented by the Landscape Department in Yuci as self-check at city level.

During the process of monitoring and measurement, local authorities normally play a passive role and the higher department may take more initiative in promoting actions. As an interviewee answered:

*“... monitoring... normally, **the higher department will come to check (monitor)**. For example, after producing a green system plan and annual plan, the city (local government)... we have three major indicators, they are rate of green space coverage, rate of green space and the per capita green rate. These indicators are used to achieve the National Garden City Award and Provincial Garden City (Town) Award. Then, the Bureau of Construction of Shanxi Province and Ministry of Housing and Urban-Rural Development of P R China will evaluate and monitor the application city. Therefore, just as the standard of Provincial Garden City (Town) has its specific regulation (bylaw or government document) from the provincial government, so Standards of National Garden City has a specific regulation (and government document) from the national government (council)..... Thus, the monitoring confirms ... if it can achieve the standard of provincial garden city (town), then it has demonstrated being able to reach some proposals (or indicators) in the green system plan. If it can reach the standard of national garden city, then basically, it has been completely achieving the coefficient index (proposals and indicators) in the green system plan ... To sum up, **self-check (self-monitor) is less and we are mainly dependant on higher departments for monitoring...**”* (Deputy Director of Jinzhong Landscape Department)

5.3.3 Conclusion

In conclusion, this section studied the green infrastructure context and management situations to determine the management conditions in Yuci, including the general context of green infrastructure development, structure of landscape management and monitoring context in Yuci.

Also, this section analysed the management structure and its relationships in planning and

policies from national to local level. Specifically, this section explains the management structure in local government and finally presents a measurement and monitoring process in current management practices in Yuci.

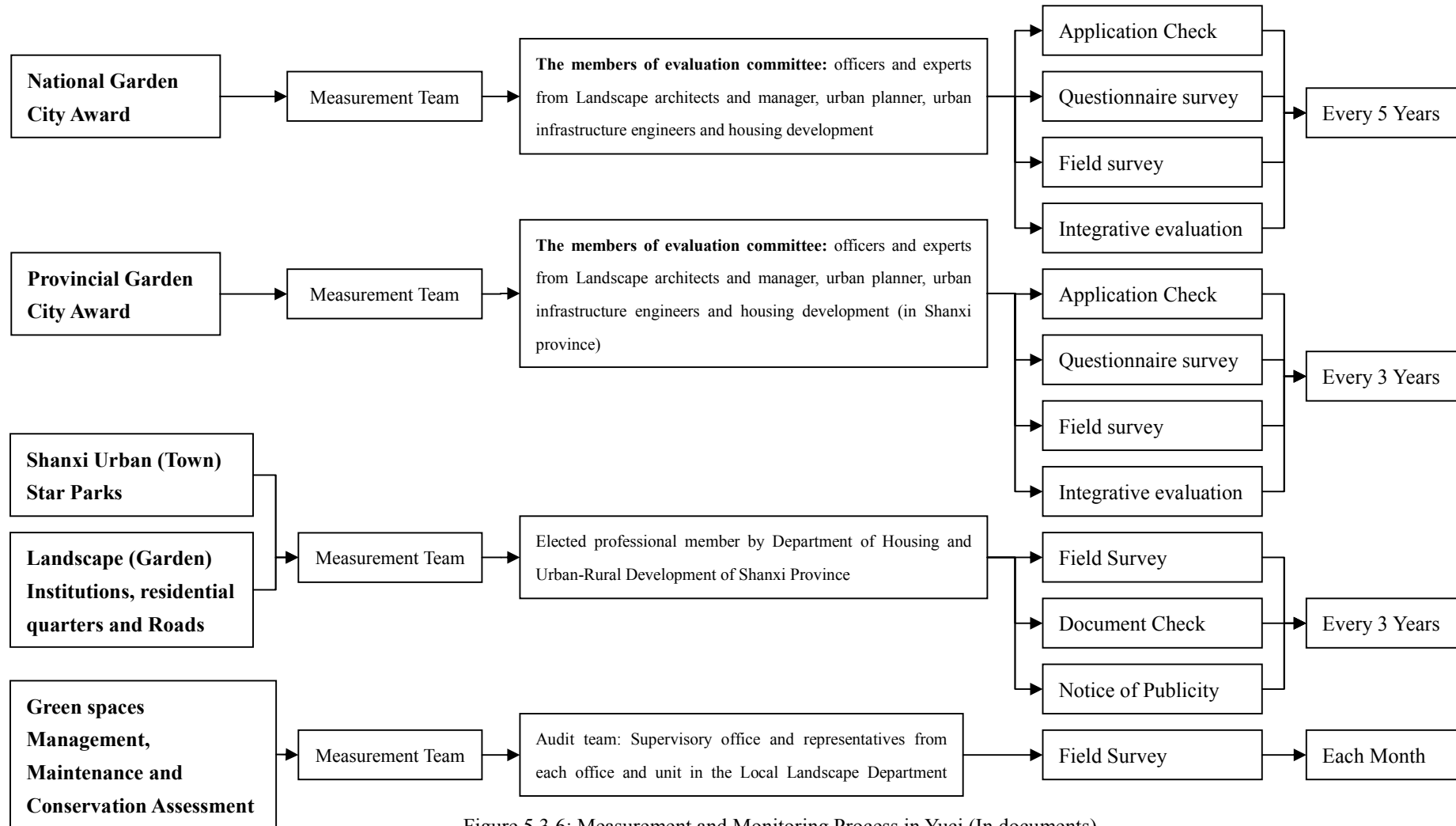


Figure 5.3.6: Measurement and Monitoring Process in Yuci (In documents)

5.4 Summary

In brief, this chapter presents general green infrastructure context and management conditions in both Sheffield and Yuci. According to GIS mapping, urban green space contexts in Sheffield and Yuci have been mapped. In Sheffield, there are various types of urban green spaces with good management and coverage of accessibility. In Yuci, there are also many different types of urban green spaces and only few types of green spaces in the urban area.

Further, this chapter also explored management and monitoring process in each city. In Sheffield, Parks and Countryside Services as a specific department in the Sheffield City Council, is responsible for managing all green and open spaces in the urban area. Similarly, in Yuci, the Landscape Department in the Jinzhong Government specifically manages green and open spaces in the urban area. This chapter has explained the structure of management in each department and also explains policy context in local level.

Additionally, through this chapter, general context of green infrastructure, management structure and monitoring process and policy context at a local level have been explored, and provide potential opportunities for improving the quality of landscape management, and instigating comparison between these two cities. The following chapters will explore the comparison analysis between these two cities.

Chapter 6: Experience of Management for Multifunctional Green Infrastructure

6.1 Introduction

Based on the study of urban green space context in Sheffield (UK) and Yuci (China) in Chapter Five, this chapter investigates key factors and opportunities from management experiences in both cities. This analysis highlights whether there has been a progression towards green infrastructure management within different management sectors and how this aspect is practiced by practitioners from various cultural backgrounds during international experiences. The themes reported in this chapter are generally based on interview themes, and aim to indicate significant experiences from practice which can be learned to guide future development of multifunctional landscape in diverse cultural contexts.

Two key spheres are analysed in this chapter. First, in order to find out the experiences of management, this chapter explores the context of developing urban green spaces in both selected cities. Through this analysis, specific contexts of managed urban green space in each city are analysed to understand their unique management perspectives.

Second, through a consideration of implementation, the impacts of authorities in managing green infrastructure are investigated in terms of practical progress. Local authority officers, as practitioners and leaders in the management process, are responsible for managing green spaces and implementing relevant plans and policies. They put their visions to effect. Therefore, this chapter also considers the structure of local authorities and their green space divisions. It also investigates management approaches linking local authorities and wider participants such as local communities.

In general, this chapter tries to determine these notions in respect of the management of urban

green spaces to find out common opinions in differing contexts. Potential benefits and barriers might be determined for wide development of multifunctional green infrastructure through a comparative case study. Examining each city within specific context will also help to explore potential gaps, such as relationships with partners, communities, knowledge of green infrastructure, and levels of experience and expertise.

6.2 Developed context of green infrastructure

Both in Sheffield and Yuci, local government and their managers have been studied to determine the context of urban green spaces. Authorities in each city have developed their green spaces with different approaches.

Additionally, in order to understand the effects of management for development of urban green spaces, Chapter Five looks at a small scale study of a 5000m x 5000m block in the urban centre in both Sheffield and Yuci. Through these case studies, the following part analyses how experiences of development of urban green spaces differ between these two cities in terms of management specifics. At the same time, this analysis also aims to provide ideas for management of accessible public urban green spaces in the urban area.

6.2.1 Context of developed urban green spaces

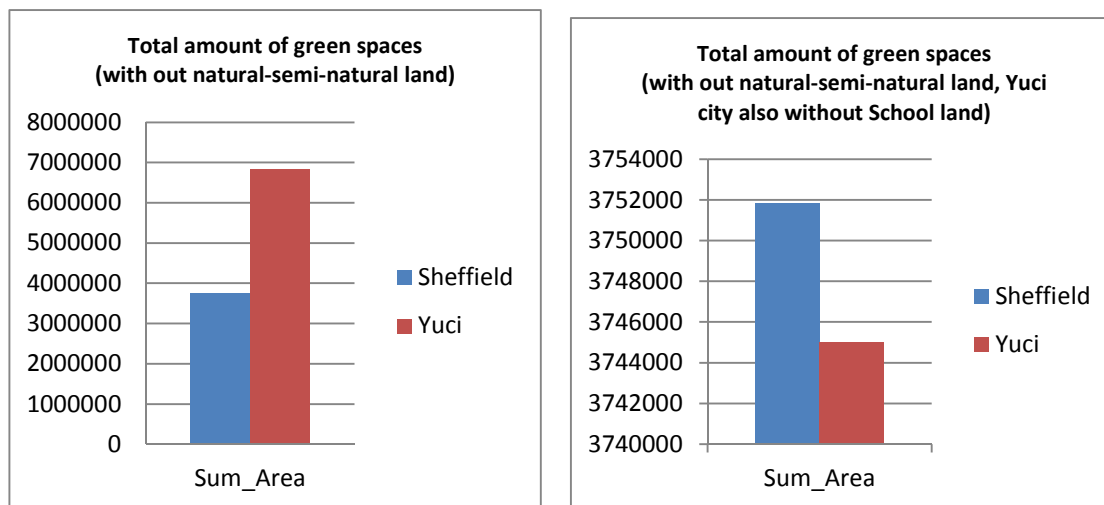


Figure 6.2.1: Compared amount of green spaces in 5000m x 5000m block between Sheffield and Yuci

This section explains the different developed context of urban green spaces in both Sheffield and Yuci. It has previously been noted that Sheffield, as the greenest city in England, has developed urban green spaces of various types which cover most of the classified types of urban green space (as classified by the typology set out in Chapter 2). The selected small-scale case shows the types of urban green space in Sheffield City Centre area, related to the comparable area in Yuci, which evidently contains fewer types of green spaces.

Figure 6.2.1 shows the amount of urban green spaces in urban centre area in Sheffield and Yuci. These figures show that the total amount of accessible urban green spaces is higher in Yuci. However, as explained before, the amount of outdoor sports facilities includes all sports fields in relevant schools and colleges. Excluding hard landscape sites, such as public squares with hard landscape in Yuci, the result might be a little different.

Therefore, if the study considers the amount of urban green spaces excluding schools and colleges in Yuci, the result is totally different. The amount of urban green spaces in Yuci is dramatically cut by more than half. As described in Chapter 5, there are not many open spaces designed specifically for children and young people in Yuci; whilst every school and college

has a sports field for their own students, these spaces in schools are not open to the public. Compared with Yuci, the city of Sheffield has substantial space for outdoor sports and spaces for children and teenagers.

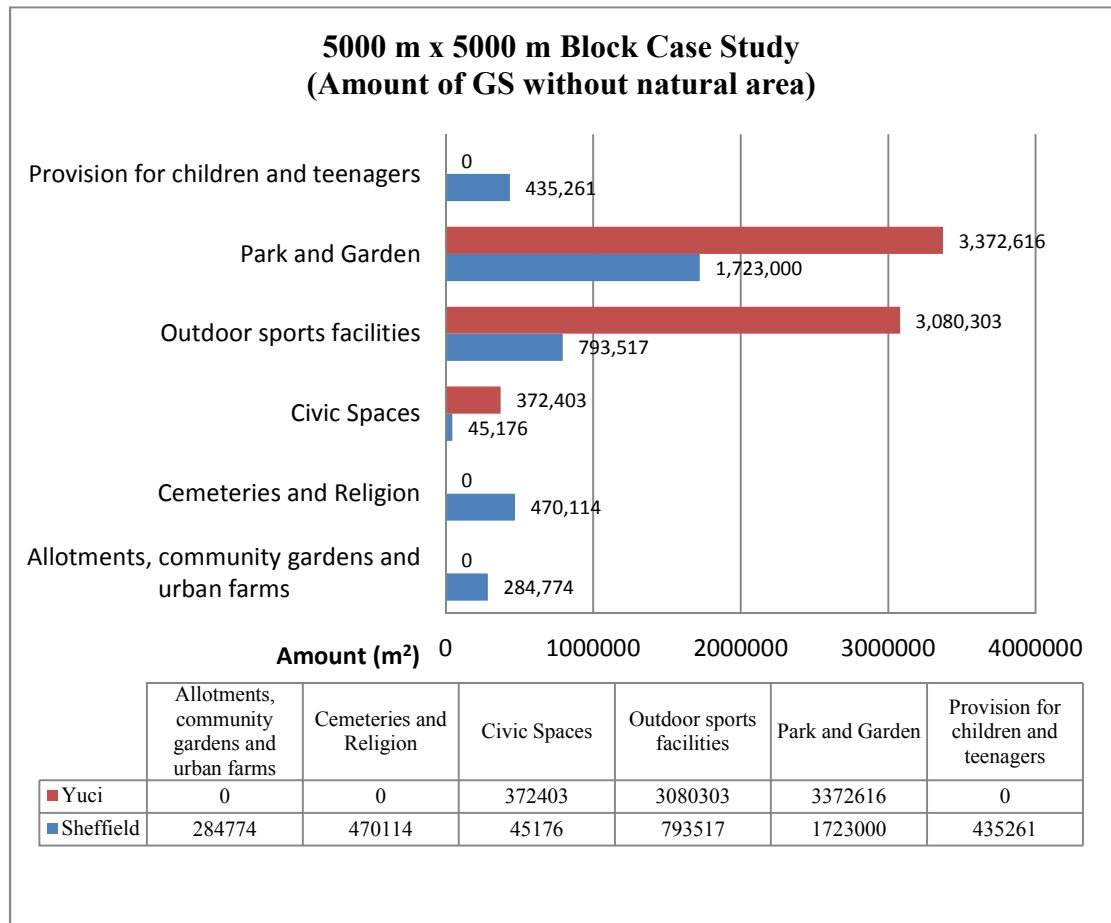


Figure 6.2.2: 5000m x 5000m Block Case Study (Amount of GS without natural area)

Furthermore, in order to illustrate how experiences and understandings reflect the development context in relation to different types of green spaces, the following part presents the existing situation for each type of green space in both Sheffield and Yuci. Figure 6.2.2 illustrates the amount of urban green spaces with different types in both Sheffield and Yuci. According to this figure, the city of Yuci has little specifically designed open space for children and teenagers, cemeteries and religion, and urban farms in the selected case area.

As Figure 6.2.2 shows, the land use types of Park and Garden, and Outdoor Sports Facilities

have the highest amount in the urban area in both Sheffield and Yuci; in particular, the area of Park and Garden is much higher than others. As Figure 6.2.2 shows, the amount of Park and Garden in Yuci is higher than in Sheffield. However, as Chapter 5 explained, these spaces of parks and gardens in Yuci contain some public squares (with hard landscape) which are identified as parks and green spaces by local authorities.

Moreover, it also analysed how many sites of each type exist in the selected area to reflect different notions of developing urban green spaces in urban areas. Similar to Figure 6.2.2, Figure 6.2.3 shows that Parks and Gardens and Sport facilities are more numerous than other types. However, the difference is that Sheffield has a greater number of sites than Yuci of both types (Parks and Gardens and Sport facilities) although the extent of these spaces in Sheffield are lower than in Yuci. For example, in the small scale area studied (5000m x 5000m block), there are more parks and gardens in Sheffield (30 sites) than Yuci (22 sites), although the average area of each site in Sheffield is smaller than Yuci (Figure 6.2.4). According to this information, local authorities and managers have centralised parks and gardens at a large scale in the urban area in Yuci, whereas local authorities and managers from Sheffield have developed urban green spaces within more diverse types that provide multiple services for local residents and visitors. Developed types of urban green spaces in Yuci seem relatively simple.

Combining these analyses, Figures 6.2.5 and 6.2.6 show the typical characters of urban green spaces in each studied block in Sheffield and Yuci. Figure 6.2.5 suggests that local authorities and managers in Yuci are interested in developing urban green spaces as parks and gardens more than other types. At the same time, outdoor and sports facilities (such as sports fields in schools and colleges) are another large type in Yuci and other types of urban green spaces are not emphasised by local authorities and managers in this study block. Based on this context, urban green spaces in Yuci often occur as designed landscape squares more than natural areas.

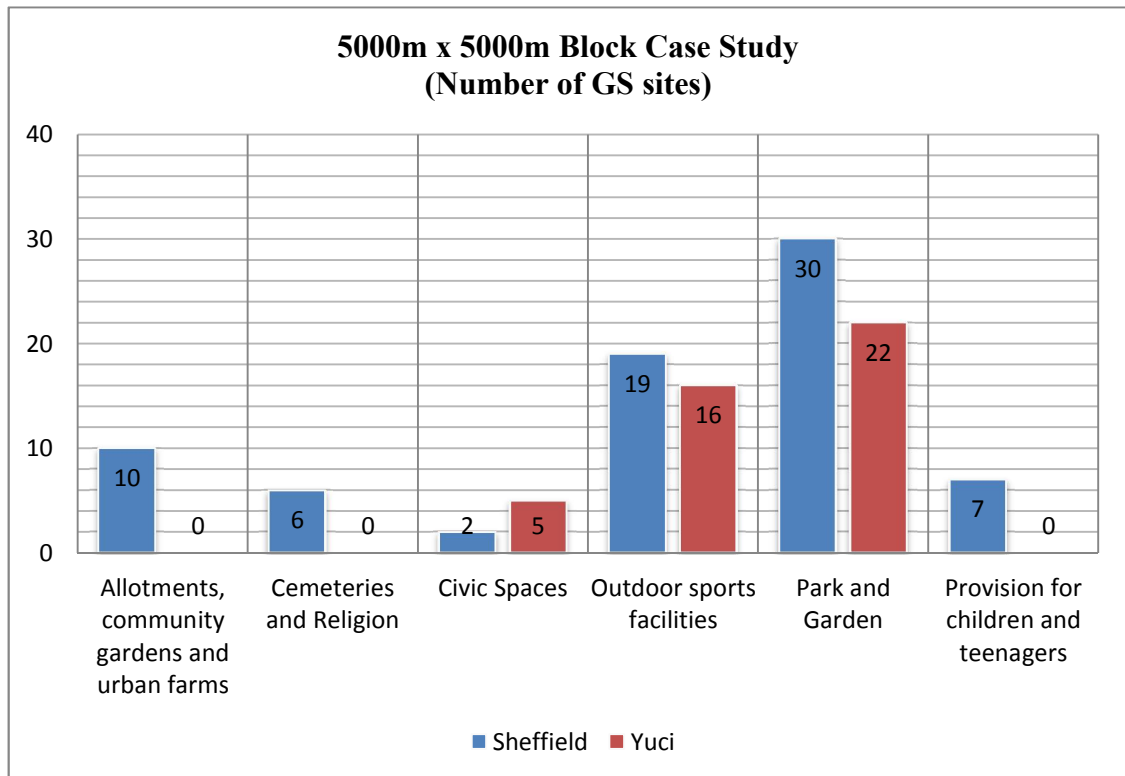
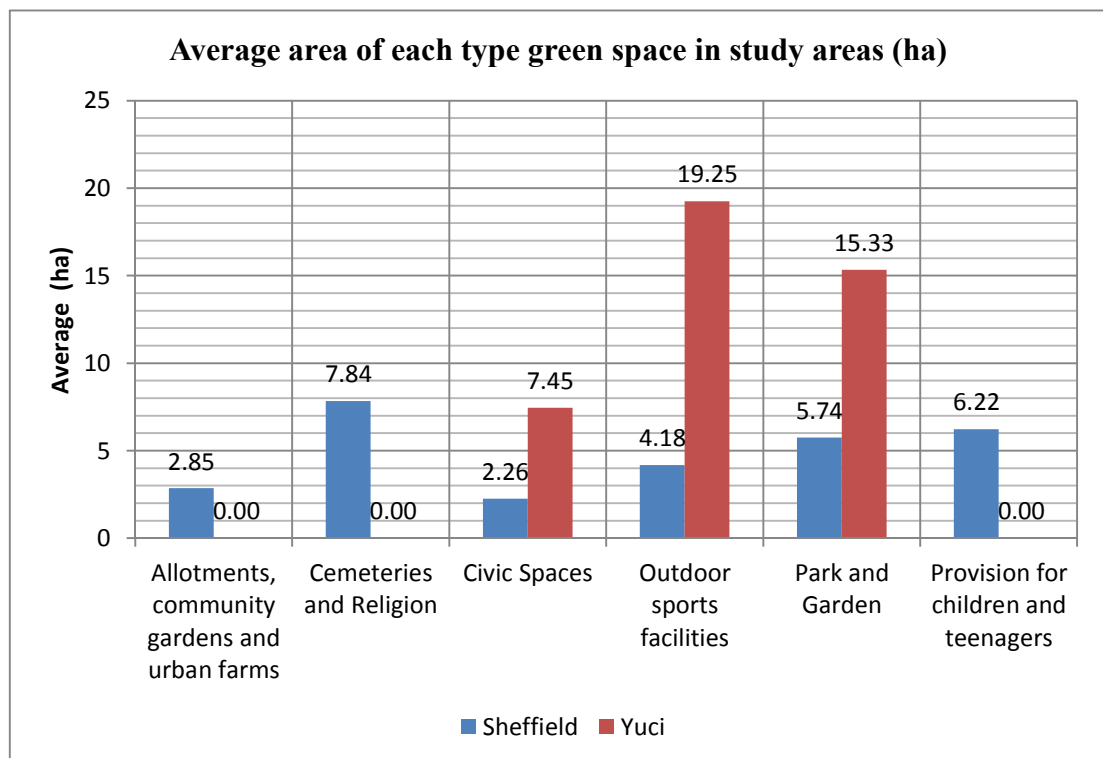


Figure 6.2.3: 5000m x 5000m Block Case Study (Number of GS without natural area)

Figure 6.2.4: 5000m x 5000m Block Case Study
(Average area per site of each type of urban green spaces)

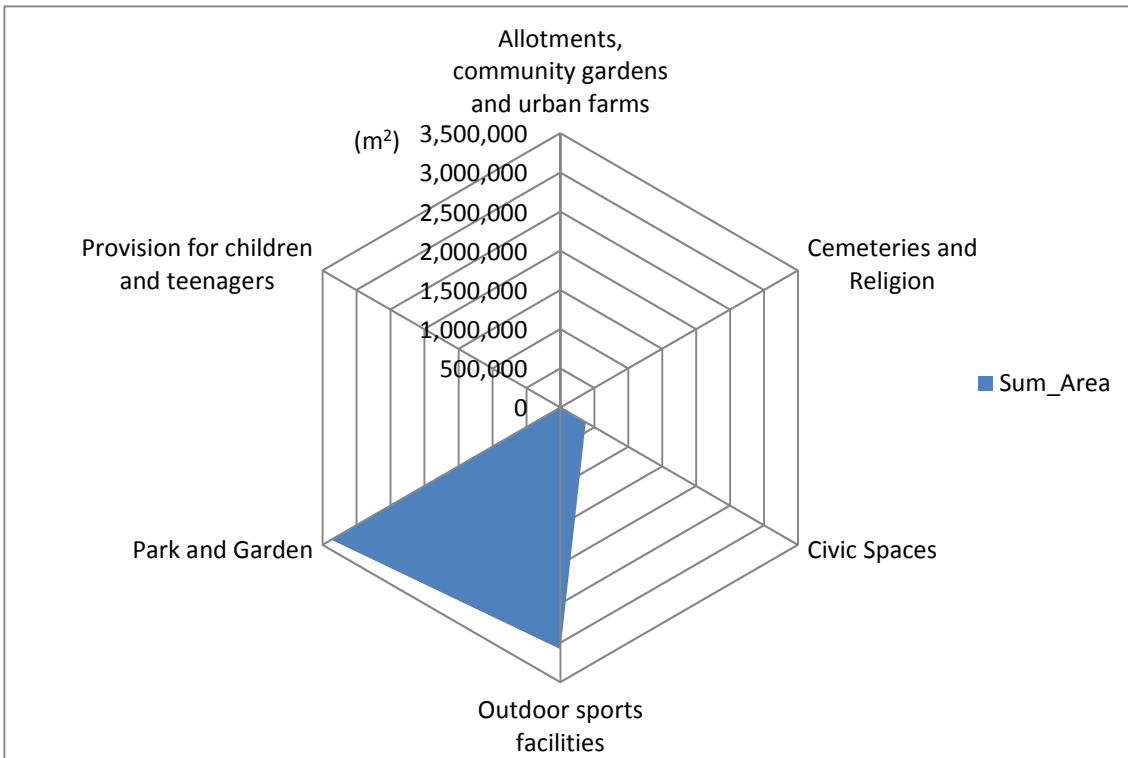


Figure 6.2.5: Distribution of total urban green spaces area in 5000m x 5000m block in Yuci

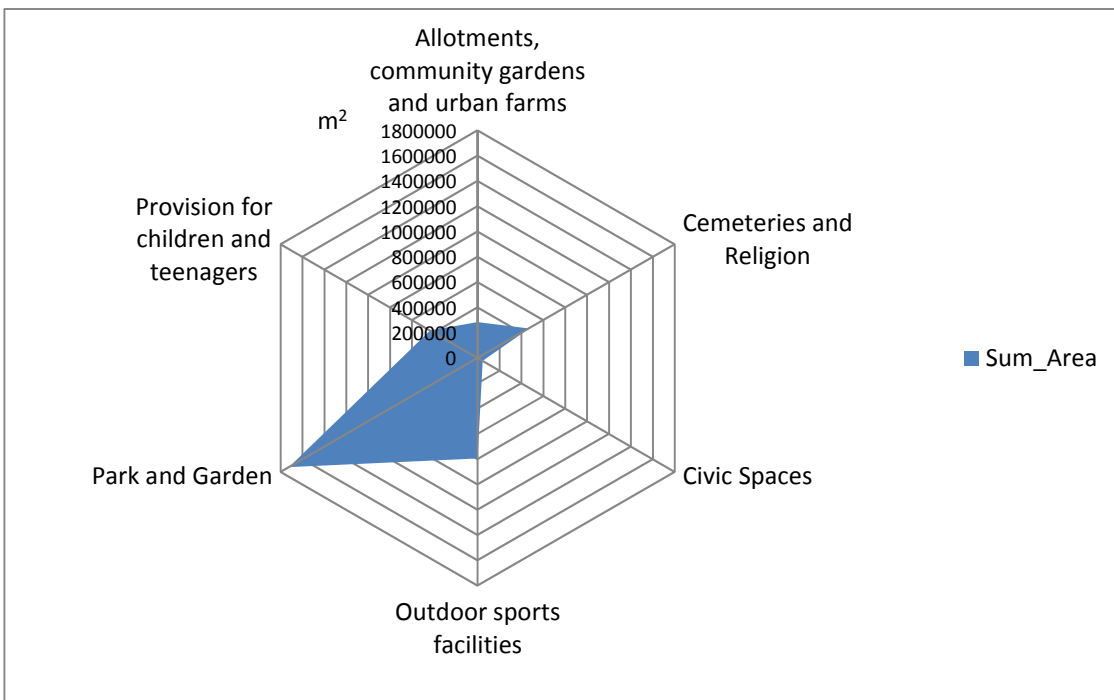


Figure 6.2.6: Distribution of total urban green spaces area in 5000m x 5000m block in Sheffield

As in Yuci, in the same small scale case study, the category of Park and Garden is more common than others types in Sheffield. On the other hand, the difference between Sheffield and Yuci is that the city of Sheffield has developed urban green spaces with a more rich type

of urban green for providing ecosystem services in sites covered with vegetation. By contrast, development of urban green spaces in Yuci tends to favour formally designed sites like parks and gardens.

In terms of green infrastructure, authorities preferred a green space system in China which composes various features (Chang et al., 2012). One interviewee from Yuci recognised that green infrastructure contained many features, such as park road (pathway in parks, gardens), plants, garden sketch and basic infrastructure in green space including water supply and drainage systems. As noted in Chapter 5, the Deputy Director of Jinzhong Landscape Department understood that green infrastructures are being related to land form, landscape design, landscape architecture, and landscape planting design. All of these understandings amongst authorities and managers impact on the development of urban green spaces in Yuci.

Compared with Yuci, local authorities and managers from Sheffield displayed broader management goals for various types of urban green spaces. Urban green spaces were managed not only for use by people, but also considered ecological and sustainable development aspects. For example, one interviewee from Sheffield revealed an understanding of green infrastructure from a benefits perspective, not just from a perspective of recreational and community use of green spaces but also from a stand point of connecting for biodiversity and water management, and energy production systems (Head of Parks and Public Realm Section, Sheffield's Parks & Countryside Service).

Hence, development of green spaces in Sheffield and Yuci presents different approaches based on their local authorities and managers' understanding and recognition which will be analysed later. It appears that development of urban green spaces in Sheffield has been aimed to promote multiple services for people through a variety of green spaces, not only developed designed parks and open spaces. On the other hand, in Yuci, local authorities and managers attempt to increase public parks and open spaces according to a high standard of parks and gardens. At the same time, development of urban green spaces in Yuci has given relatively little consideration to other spaces such as specific children's playgrounds and spaces for

wildlife.

Thus, the development of urban green spaces presents itself differently in Sheffield and in Yuci (Table 6.2.1). These differences arise from a different process of developing urban green spaces in both cities, combined with various factors such as cultural background, training and economic impacts. In Sheffield, these benefits have been understood and developed in decades. On the other hand, in Yuci, government is realising, more and more, the value of urban green space development and is paying increasing attention with investment. Overall, the city of Sheffield has developed a quantity of urban green spaces to provide services for people, whereas the city of Yuci is trying to increase the quantity of urban green spaces for its citizens.

Sheffield	Yuci
<ul style="list-style-type: none"> ● Most types of urban green spaces exist ● More sites of each existing type of urban green space ● Prefer to contain more types of urban green spaces for multiple services and benefits. 	<ul style="list-style-type: none"> ● Only a few types of urban green spaces exist in the city and these are preferred to designed spaces and parks. ● Fewer sites for each existing types of urban green space, with many large designed parks and open spaces ● Prefer to design parks and gardens, outdoor sports facilities for servicing people in the city.

6.2.2 Understanding of Green Infrastructure amongst Managers

This study reflected a degree of understanding of green infrastructure amongst management process, albeit different backgrounds and knowledge. The context of developed urban green spaces in each city reflects the understanding of managing urban green spaces and management approaches amongst practitioners.

For instance, as mentioned previously, an interviewee from Sheffield commented that “... *Good quality of urban green spaces... I suppose it’s a question of green space, but that could quite easily be what we term the public realm. ... So it can be hard or soft landscape areas ...*”

(Head of Policy and Projects Section, Sheffield's Parks & Countryside Service).

Moreover, governments in both Sheffield and Yuci have developed specific standards (or evaluations) to determine and guide improvement in quality of sites. In this condition, the quality of urban green spaces is usually managed to meet relevant standards and purposes to achieve specific awards.

For example, Sheffield City Council has developed the Sheffield Green Space Strategy (1993) and Sheffield's Urban green Space Strategy (GOSS, 2010) to develop and manage urban green spaces as a citywide green network. As discussed in Chapter 5, these strategies present approaches to the development of urban green spaces in Sheffield. The GOSS provided a basis on which to improve quality and services of urban green spaces for well-being and sustainable development, related to the quality of management.

Similarly, local government in Yuci has produced a Green System Plan to guide development of urban green space for future decades in Yuci. It promotes increasing the quantity of urban green spaces in the urban area and providing more spaces for leisure activities at the city level.

Furthermore, in Sheffield, the Green Flag Standard is generally recognised as the national standard for parks and green spaces, to recognise the quality of individual sites (CABE, 2006c). (Although the Green Flag standard is voluntary, not statutory, most authorities and managers have recognised and accepted it, as discussed in Chapter 5.) On the other hand, the council has developed the Sheffield Standard as a local criterion-based standard for enhancing the quality of sites. Both Green Flag Standard and Sheffield Standard are focused on quality, impression and services as measured on site. Here, local authorities and managers understand quality in terms of providing multiple benefits and services from green spaces to users and visitors.

In Yuci, local authorities and managers sought naturalistic spaces as quality of green spaces where people felt comfortable. For example, the Deputy Director of Jinzhong Landscape

Department recognised that *“The quality of urban green space...is natural or comfortable... Now, people prefer human-oriented places, like everything should feel natural and comfortable. People like to return to nature and simulate the natural environment.”* According to his view, development of quality urban green spaces should include three aspects of design and maintenance, such as quality design and planning with a well designed sensible road system, management to avoid losing green spaces and maintenance to keep green spaces in good condition, such as clearing, watering and pest control.

Also, as noted in Chapter 5, the Standard of Star Park in Shanxi Province has been adapted by local authorities in Yuci to enhance the quality of parks. In the same way as Sheffield, local authorities manage their spaces to meet relevant standards or criteria from national to local levels.

From the discussion above, it may be understood that urban green space management approaches are reflected in green space development in different ways. In Sheffield, development of urban green spaces is considered as a network of green infrastructure to deliver multiple services and benefits. Local authorities and managers have an understanding of how to manage their spaces for multifunctionality. In Yuci, local authorities seek to increase the quantity of designed urban green spaces in the urban area and have considered and promote the development of a network of urban green spaces around the urban area.

6.3 Impacts of authorities on improving the management of green infrastructure

6.3.1 Introduction

Management of green infrastructure is generally implemented by authorities and managers who are responsible for running the management process. As practitioners of management implementation, their knowledge, vision and understanding essentially influence the landscape management approach. It is valuable to investigate the role of local authorities and managers in management. At the same time, the structure of management essentially provides a way for organising authorities to implement management. Hence, the structure of management practice and the commitment to landscape management from local authorities and influences the effectiveness of management and implementation. Local authorities and managers always have a variety of understandings of managing urban green spaces according to their experiences. Hence, as a comparative study, this analysis has tried to contrast differences in structure of management and the roles of authorities in the selected cities.

Local authorities and managers directly manage and provide services for the quality of urban green spaces. In this process, local authorities work with different participants to obtain better support and services. Hence, the relationship between authorities and other participants is considered essential to provide effective operation. The leadership exercised by local authorities impacts on the effective management of green infrastructure. Good leadership provides effective management from the management team. Poor leadership might adversely affect the management visions. As well-concerned structure in a local authority brings better services and efficiencies in implementation; hence, effective management relies on a well-organised management group.

Moreover, based on professional knowledge and understanding, practitioners adopt different initiatives in their management processes which impact on ability and motivation to gain

resources such as funds for developing parks and open spaces. Therefore, this section explores the potential roles of managers and authorities.

6.3.2 Management structure and role of authorities

As mentioned before, it is necessary to consider institutional structure to explore effective management (Thomas and Middleton, 2003). Chapter 5 explained the general structure of landscape management in both Sheffield and Yuci. Based on the explanation in Chapter 5, this section looks at comparative practice and experiences of enhancing efficiency of management in the management process, making plans, taking implementation and monitoring.

For example, as explained in Chapter 5, there is a specific department in each local council that is responsible for managing, maintaining and developing urban green spaces in both Sheffield and Yuci. In Sheffield, the department is Parks and Countryside Service, and in Yuci, it is the Jinzhong Landscape Department.

In Sheffield, the department is responsible for all green space management, maintenance and development. The management and development of all green space in the whole city under one department includes managing and maintaining parks, forests and all other green spaces (excluding the Peak District National Park) from the countryside to the urban area.

The organisation of the department is modified according to the council's needs. For instance, as the Head of Policy and Projects Section from Sheffield's Parks & Countryside Service noted, this department has undergone reorganisation and consequent merging within Culture and Environment which brings together the arts, sports, museums, the city centre, parks, countryside, trees and woodlands, and major sports facilities. However, this change only reduced capacity and did not cut down responsibility from the Parks and Countryside Service which still covers the same areas and functions and oversees the day-to-day management of sites. This change, joined up with cultural development, brings opportunities for the Parks and

Countryside Service to cooperate with other sections. Further, the department has some in-house capacity for working with communities and other departments.

In Yuci, the Landscape Department in Jinzhong has general responsibility for management of landscape in the whole Jinzhong region. Moreover, the department also specifically manages urban green spaces in Yuci district as the central district of Jinzhong. Compared with Sheffield, the department has a similar role in management, maintenance and development of urban green spaces. The main works of managing, maintaining and developing urban green spaces in the urban area are under the Landscape Department. However, the department is only responsible for the urban area; forest and agricultural land are managed by the Bureau of Forest and Bureau of Agriculture. Certain functions of the Landscape Department are mandated by higher government levels and cover various phases which include landscape, greening strategies, principles and policies, laws and regulations.

The explanation of departmental structures in Chapter 5 showed how the Landscape Department in Jinzhong has also been modified by Jinzhong Local Government to enhance work efficiency in the management process. It just modified functions for each section and responsibilities of divisions. This change provided clear tasks for each section in the department (as explained by the Head of Planning and Policies Section in Jinzhong Landscape Department). The interviewee noted that the department organises and implements normative documents about landscape management for the whole city. For example, it is responsible for a “green stamp” approval system and operating a “green line” system to safeguard green spaces.

Both in Sheffield and Yuci, experiences and knowledge are recognised as being important to good practices in landscape departments. For example, Sheffield Parks & Countryside Service has been concerned to keep abreast of changes and to ensure varied experiences among staff toward new ideas such as multifunctionality and green infrastructure.

On the other hand, the department of landscape in Yuci is concerned about more mainstream

skills for improving staff experience and professionalism (which will be discussed in the following section). The department has the right to employ its own 'direct labour' force and to run some horticultural and technical work. Furthermore, it also has a good capability for planning, construction, management and regulation, but its in-house landscape design capacity is somewhat limited (as mentioned by the Head of Planning and Polices Section in Jinzhong Landscape Department).

In general, these landscape departments in both Sheffield and Yuci have a similar role in the management of green spaces. For example, all green space management, maintenance and development are under the department of landscape. And these landscape departments in both cities are organised by their own local government (council) and have similar functions in the process of landscape management. However, given their specific context, each department presents different aspects in its own city. As mentioned before, the landscape department in Sheffield works to manage plans and projects, improved community involvement, and biodiversity. In Yuci, the department works for landscape, greening strategies, principles and policies, laws and regulations. It is also responsible for implementing normative documents about landscape management such as the green system plan and working within the context of the city's five year plans.

Table 6.3.1 shows common points between the landscape department of Sheffield and Yuci. These common points suggest a vision that responsibility, organisation, cooperation with other departments and staff knowledge for staff are recognised as being important in landscape management in varied contexts. These common features generally occur in landscape departments for organising and implementing the management of urban green spaces. For example, responsibility for management, maintenance and development for green spaces is under one department and is organised by its local authority for achieving efficiency of management.

Table 6.3.1: Common points between landscape departments in Sheffield and Yuci

<ol style="list-style-type: none"> 1. All green space management, maintenance and development under one department 2. Organised by own local government (council) and responsible for organising and implementing normative documents about landscape management 3. Some in-house capacity for working with other departments in local government 4. Concerned to promote skills, knowledge and experience among staff
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On the other hand, according to their specific context and background, the landscape department in each city also displays different aspects of working practices (Table 6.3.2). Hence, there are three main differences between Sheffield and Yuci which result in differences in the management progress.

For example, in Yuci, green spaces from countryside to urban are managed by different divisions such as landscape department, Bureau of Forestry, Bureau of Agriculture and Travel Bureau, even though the landscape department is mainly in charge of development of urban green spaces in the city.

Given their different organisation structures, the landscape department in each city has a different capacity to achieve management and maintenance. For instance, in Sheffield, the department's role as client often results in day-to-day management by contractors. Conversely, the landscape department in Yuci has their own labour force to run day-to-day management which is funded by local government. However, as explained by the third difference, the landscape department in Yuci has to prioritise mainstream skills for its staff that are responsible for daily management of urban green spaces. And whilst the department in Sheffield has long and varied experience among its staff, they need to make sure that they keep abreast of new ideas like multifunctionality and green infrastructure.

In general, these commonalities and differences between both cities help us to understand where general aspects in management structure can be promoted and where improvement can be made in terms of responsibility, management capacity and experience.

1. Territory of responsibility is different	Sheffield	Manage whole city including countryside and urban area
	Yuci	Manage urban area; forest and countryside are managed by other departments
2. Maintenance and management capacity	Sheffield	Acts in client role to oversee the day-to-day management of sites, as work is often contracted-out
	Yuci	Own 'direct labour' force and has responsibility for some horticultural/technical training;
3. Different aspects of enhancing experiences and skills for staff	Sheffield	Long and varied experience among staff, but need to make sure that change towards new ideas like multifunctionality and green infrastructure is managed thoughtfully and positively (i.e. 'change management' skills), else may experience resistance
	Yuci	Concerns are about more mainstream skills, e.g. some gaps in basic horticultural knowledge with some staff, some poor coordination between sites because each site has its separate team, need for further capacity in planning and design

6.3.3 Working with diverse partners

6.3.3.1 Ways of working with other professionals

As a complex matter, the management of green spaces requires cooperation between various departments in a local government. This happens in both Sheffield and Yuci. For example, Parks & Countryside Service cooperated with the planning department and has some in-house capacity for working with communities. The Head of Policy and Projects Section explained that

“... We work with our colleagues in the planning department. And we also mission landscape architects to assist us and so on ... we’ve got people who work with communities, we’ve got people who cut the grass and maintain the sites... we’ve also got people who develop new playgrounds and new parks and so on, new facilities within the green infrastructure within the city.”

As observed from Sheffield practice, managers in the department recognise they cannot do everything themselves. The department is working closely with the planning department and other departments within the council and different agencies and community groups to collaborate in managing the green space estate for best use.

The idea in the Open Space Strategy, is for the Parks & Countryside Service to bring all players together and to work in harmony. For example, an interviewee from the department mentioned that the department provides some contracting arrangements from other client departments for daily management and maintenance, like maintaining landscape areas for the housing department.

In the department, there is a core management group that brings together agencies and partners to approach management, improve quality and develop programmes, projects and plans. For example, the Head of the Parks and Public Realm Section explained, *“... in terms of planning and of designing work, we might commission architects in the planning department to design improvements in parks for us, or new parks. So we are working collectively, collaboratively...”*

As the Head of the Policy and Projects Section described, they have a close relationship with other departments and have recently increasingly been joining up to look at the spaces between managed spaces and access by people. Moreover, the department also acts to commission work from other departments (e.g. design services from planning), and is a consultee on other departments’ policies (e.g. Local Development Framework). Through

recognising its responsibility for green infrastructure, this department works with planning and takes the lead for delivering the urban green spaces strategy and acts as a client. However, there is also a cross-departmental infrastructure delivery group, currently led by planning. The department therefore normally cooperates with various other departments and involves key partners.

In contrast, the landscape department in Yuci is mainly responsible for technical work related to landscape. In Yuci, this is a complex matter in the management of green spaces. The landscape department has to coordinate with other departments, sometimes in a cross-departmental working context. For example, the department work with the Planning Department, Housing and Urban Rural Construction Bureaus, the Finance Department and the Forestry Department. Sometimes, in cases of land acquisition, removal and resettlement, because these require a large area of land, the land acquisition has to be coordinated by the Land Bureau, Planning Department, District Government, country government (country or village local council) and local communities or other groups.

Similar to Sheffield, the Planning Department leads the process of city development. Therefore, although the Landscape Department is responsible for leading the green space system plan, it must be based on the city's master plan.

Furthermore, in Yuci, each department is mandated functions by the higher government level and by Jinzhong District Government. The landscape department cooperates with other departments in large planning projects and cooperates as a consultee mainly at the early stages. After that, each department does their own work without further interference. In this case, some isolated issues potentially happen because of lack of communication with others. In addition, the landscape department in Yuci has involved some Public Investment Corporations in the construction process of large projects to achieve a variety of different sources of financing. The reason is that local departments wish to gain financial support which is difficult to obtain from local government, and so must be sought from central government. At the same time, these Public Investment Corporations (companies) have the right to attract investment

from Folk Capital, which is not available to government departments. Additionally, the planning department may plan large-scale projects whilst the landscape department later undertakes planting and management.

Broadly speaking, the landscape department in both cities has been working with different departments and professionals. Both in Sheffield and Yuci, the local landscape department cooperates closely with other departments and professionals. On the other hand, the department in each city has its specific ways and views in the management process. In Sheffield, the landscape department worked with various departments and diverse groups in collaborative ways, and some resources are being shifted to achieve more spatial linkage on the ground. The local authorities also clearly recognise that they cannot do everything themselves and encourage more partners and community involvement. In contrast, in Yuci, the landscape department also works closely with relevant departments, as it increasingly realises the importance of community groups in the management of urban green spaces. However, with different management aims, they do so to gain funds and economic benefits rather than community involvement, which is not currently necessary in the management of green infrastructure.

Table 6.2.3: Comparison of ways of working with other professionals between Sheffield and Yuci	
Common ways of working with other professionals between Sheffield and Yuci	
<ol style="list-style-type: none"> 1. Working closely with other departments in local government 2. Cooperating with professionals such as designers and planners 3. Organising projects as client and working with professionals 	
Specific views for ways of working with other professionals between Sheffield and Yuci	
Sheffield	Yuci
<ul style="list-style-type: none"> ● Recognise cannot do everything themselves, but see this as a virtue 	<ul style="list-style-type: none"> ● Mainly responsible for technical work related to landscape;
<ul style="list-style-type: none"> ● Increasingly joined-up approach to collaborative working, and some resources being shifted to achieve more spatial linkage on the ground; 	<ul style="list-style-type: none"> ● Public Investment Corporations (companies) may be involved in the construction/ development process, especially in large projects, because they can seek different sources of financing; also, the planning department may plan large scale projects whilst the landscape department later undertakes planting and management
<ul style="list-style-type: none"> ● Act as clients for some departments 	<ul style="list-style-type: none"> ● Departments are relatively independent and their

<ul style="list-style-type: none"> ● Takes the lead for delivering the urban green spaces strategy, but there is also a cross-departmental infrastructure delivery group, currently led by planning 	<p>functions are different and co-operate with each other such as in large planning projects</p> <ul style="list-style-type: none"> ● Cooperate mainly at the early stages but after the project plan has been approved each department does their own work without further interference;
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6.3.3.2 Ways of working with communities and NGOs

In the UK, community groups have become involved in managing urban green spaces (CABE, 2007b). Sheffield has joined with a range of communities, partners and trusts in the management of urban green spaces, such as the Sheffield Wildlife Trust. Moreover, most of the parks and gardens in Sheffield have their own friends groups to support development of individual parks, for example, Friends of Firth Park, Friends of Crookesmoor Park and Friends of the Botanical Gardens. The landscape department works with these friends' groups and supports and advises them in managing local sites, though the department retains a legal responsibility to make the site safe and thereby maintain an influence in design and delivery.

Furthermore, importantly, local authorities understood that community involvement is a bottom-up, voluntary, organic approach. The department suggested that community involvement was generally a case of communities to taking the initiative in approaching the department by themselves rather than by being led. The Head of Policy and Projects Section pointed out that *“we don't go and invent the community groups, but often groups come together because they're dissatisfied with existing conditions/facilities”*. In this situation, communities and interested groups may have their own preferences to support the relevant management issues. For example, they may want to raise funds or put pressure on the government to seek solutions through community involvement.

Some of these communities have their own agendas for improving relevant sites, but these have to be compatible with the department. The landscape department in Sheffield has a team to work with groups to help them find funds, skills and property. Sometimes, community groups can access sources of funding that the landscape department cannot achieve. Besides,

in Sheffield, this is an important role for organisations, third sector work for profit such as Sheffield Wildlife Trust and Green Estate, who manage via long-lease agreements, and can also attract additional income (Head of Policy and Projects Section, personal communication). The landscape department in Sheffield may sometimes work with groups for maintenance and management with division of labour, in loose partnership, for example, the department might cut the grass whilst the partners would do all the other work such as litter picking and managing hedges.

Further, the City Council has promoted Community Assemblies as non-government groups in seven wards to help decide how the Council could better deliver services. The landscape department feeds its priorities through the Community Assembly Plans, and these will feed in additional, local priorities. Sometime, politicians are very interested in seeing improvements in their wards and will put pressure on the Council to commit funds

The Sheffield's Parks and Countryside Service has a vision to get as much community ownership and involvement as possible. The department considers that people could cherish the space and look after it, and site abuse would be reduced if people were involved in the management process. Of course, local authorities also realised the level of commitment is variable. For example, there may be a lot of anti-social behaviour in some areas, especially in poorer areas where there are more pressing priorities. In order to relieve this condition, the landscape department works with schools and children to build appreciation of landscape values and benefits from an early age.

In Yuci, the Head of Planning and Polices Section in Jinzhong Landscape Department, points out that there are some policies to encourage communities to manage residential and institutional green spaces, but they are not promoted proactively by local authorities.

Local authorities usually cooperate with relevant departments in local government rather than work with partners and communities. The Deputy Director of Jinzhong Landscape Department noted that communities such as non-government organisations have only a very limited

involvement in the management process. He points out that only a few groups have emerged in recent years and then to be associated tourist attractions (such as beauty spots), but there are few in respect of landscape and green spaces. Interviewees from Yuci stated that people may not appreciate the value of landscape and might damage it. Therefore, the department aims to improve respect for green space from the public. Meanwhile, there is an emerging culture in Yuci that people prefer the natural types of site in urban areas, and want to bring nature back into their lives. Whilst this is at an early stage, it does present new opportunities for encouraging and promoting community involvement.

As discussed above, local authorities and managers are encouraging more communities and partners into the management process. In Yuci, however, most of the resources are secured through government and so most liaison is based on securing funds to manage and develop spaces and less priority is attached to community involvement, although there are now some policies to this effect.

Leadership of Authorities

Another key factor for quality management is the availability of leadership and management ability in local authorities. As discussed before, landscape management involves various departments, partners and the wider community. The management team is made up of many members who might come from different departments in local government or parks, stakeholders and partners. Therefore, a strong leadership is necessary to organise and lead the team. CABE (2010b) has pointed out that the most important driver of performance is the quality of political and managerial leadership and access to a green spaces team.

“Strong leadership provides advocacy, vision and ambition for the service at a cabinet or managerial level; secures and protects funding; builds partnerships; drives innovation; and provides motivation. Investment in skills at all levels is needed to achieve good leadership. Successful heads of service are communicators, motivators, advocates and brokers” (CABE, 2010b, P. 6)

In this respect, local government always plays a leadership role to organise relevant members in the management process. In Sheffield, the Parks and Countryside Service as a major department is responsible for managing and developing the urban green spaces in Sheffield. Its role is organisational as much as divertive whilst different departments in a City Council are charged with different management elements; normally the landscape department leads the work of managing urban green spaces, and this is the case in both Sheffield in Jinzhong.

Successful heads of management teams need to play the role of communicators, motivators and advocates to encourage their team to deliver better services (Barber, 2005). For example, the Head of the Policy and Projects Section chairs the GOSS management group which brings together partners and agencies to discuss management and development programmes and projects. He considered that his role is to work with group members in planning and bringing into all the relevant expertise and knowledge together to best effect. In a similar vein, the Head of Parks and Public Realm Section stated, *“I manage a section for managers to look after teams of people. And each of those teams is responsible for management and maintenance of sites.”*

In Yuci, the Deputy Director of the Landscape Department believes his role is one of leadership in the department to work with relevant groups and other departments in local government, especially ensuring the right balance to ensure good working relationships. For example, he stated:

“When we need to coordinate with departments, such as assisting another department, or needing someone to help, we bring in people who are suited to that role, especially in land acquisition, removal and resettlement. For example, in land acquisition, removal and resettlement, the landscape project needs large areas of land. So the land acquisition involves cooperation between the Land Bureau (national land department at local level), the Planning Department, the District Government, country government (country or village local council) and local communities or other groups. Therefore, it needs organisation and coordination.

Through coordination, further work can run smoothly...”

According to these interviewees' views, authorities have a clear understanding of their role in the management process. They aim for an ability to keep a balance in their management team, to organise work schedules and gain more resources for achieving their visions and aims. Moreover, good managers and authorities are able to appreciate what needs to be done to realise their aims, and to direct leadership skills at different levels to drive improvements in services.

Working with communities and diverse groups is considered an important part in the management process in both cities. Nevertheless, based on different contexts, ways of working with communities manifest themselves differently in each city. In Sheffield, the department realised that community involvement is a voluntary and organic approach and does not tend to lead them but encourage communities to engage with management by themselves. In Yuci, the local department actually already realises the importance and benefits of working with communities and other groups, and does have some policies to encourage community involvement. However, this aspect, it is not yet working well because of lack of experience and understanding.

Importantly, cooperation with communities and relevant groups could bring additional benefits. As discussed above, the interests and responsibilities of community and relevant groups could bring many benefits to developing urban green spaces. As Table 6.2.4 sets out, support from politicians to non-government organisations essentially provides extra resources to improve their spaces such as funds and policy priority. Similarly, in Yuci, some spaces are also managed and maintained by communities themselves, such as institutional and residential green spaces being maintained by their owners. However, they are not voluntary and are monitored by the local council department.

Table 6.2.4: Comparison of cooperation with communities and NGOs		
	Landscape Department in Sheffield	Landscape Department in Yuci
Relationship between department and communities	<ul style="list-style-type: none"> ● A bottom-up, voluntary, organic approach ● Tend to wait for communities to come to Council rather than leading ● Don't go and invent the community groups, but often groups come together because they're dissatisfied with existing conditions/ facilities 	<ul style="list-style-type: none"> ● Has policies to encourage community involvement but not promoted well ● Local department leads activities
Properties and Function	<ul style="list-style-type: none"> ● Work with third party not-for-profit organisations such as Sheffield Wildlife Trust and Green Estate, who manage via long-lease agreements, and can also attract additional income ● Politicians very interested in improvements, and the Council can sometimes put pressure on politicians to commit funds, essentially, end up with a community plan based on local priorities 	<ul style="list-style-type: none"> ● Institutional and residential spaces managed by owners and only monitored by the department on occasion ● An emerging culture that people prefer the 'natural' and want to bring nature back into their lives
Relationship of cooperation ways	<ul style="list-style-type: none"> ● Some groups will have their own agendas (e.g. managing for biodiversity) but these are compatible with the Council's ● Work with small groups of people, for example: may cut the grass and they do all the other work such as picking up litter and managing hedges, like a partnership but simpler ● Feed our priorities through the Community Assembly Plans which will be delivered through the Community Assembly and with local people, and these will include additional, local priorities ● Support and advise local groups, 'friends of' groups, residents' associations in managing local sites, though the department retains a legal responsibility to make the site safe and so maintain its influence in design and delivery ● Get as much community ownership and involvement as possible, "because they'll cherish the space and look after it and stop it being abused, if people are involved" ● Works with schools and children to build appreciation of landscape values and 	

	benefits from an early age to relieve and resolve anti-social behaviour in some areas	
Role of communities and NGOS	<ul style="list-style-type: none"> Urban and city spaces are very valued and cherished by people in Sheffield which also helps the council to prioritise and protect, because if there was a proposal to build on green space, there would be a lot of opposition 	<ul style="list-style-type: none"> People may not appreciate the value of landscape and will damage it sometimes (especially in winter)

6.3.4 Knowledge and management of multifunctionality

CABE (2004a) has pointed out that the process of green space management should begin with an understanding of green space, and of the objective of green space management. Hence, a correct understanding of relevant concepts and needs is essential to successful management (CABE, 2004a). In this case, the two cities developed their urban green spaces in different ways and display different understandings. A better understanding of the notion of multifunctionality could help to improve the quality of management (Barber, 2007a). Also, the CLERE model acknowledges multifunctionality as a helpful means of promoting integrated, cross-disciplinary management.

Thus, management practices have the opportunity to develop urban green spaces in ways that deliver multiple services and deal with complex issues such as improving quality of air, reducing pollution and retaining a sustainable natural context. Based on a general notion of multifunctionality, local authorities and managers could consider diverse management approaches to develop their spaces in different ways, adapted to local contexts.

In the UK, there has already been a rich range of experience of management for multifunctionality of urban green spaces. Since 2005, the CLERE model has been promoted in management practice (Barber, 2005). This model clearly considered a series of management issues and aspects for developing urban green spaces as a multifunctional network, and has helped to identify multifunctional green infrastructure for holistic management (Barber, 2007a). Similarly, the Landscape Institute in England has also promoted knowledge of

multifunctional green infrastructure in practice through case studies and public seminars since 2009 (Landscape Institute, 2009b, 2011, 2013).

Based on these developments, practitioners in Sheffield demonstrated multifunctional knowledge to manage urban green spaces for multiple services and benefits. According to one interview, a practitioner understood multifunctionality of green infrastructure as “... *not like the farm in the traditional agricultural sense, but farmed in... the sense that there's other benefits, so there may be recreation or health benefits for communities and environmental benefits in terms of how we manage spaces and benefits for wildlife. So a number of benefits which are the kind of produce of what we're imagining. So I think it is perhaps quite a useful analogy to think about the different benefits and different functions, of what may sometimes be the same space with many benefits.*” (Head of Policy and Projects Section, Sheffield's Parks & Countryside Service)

Furthermore, local authorities from Sheffield recognised that the understanding of green infrastructure lay in looking at holistic kinds of spaces and the interaction of these spaces throughout the city. These spaces, including the rural area beyond the city, should be holistically connected and developed for people and wildlife. The Head of Policy and Projects Section from Sheffield's Parks & Countryside Service expressed the opinion that previously, the focus had been too much on the micro level rather than on the bigger macro level of green infrastructure in planning terms. Therefore, local authorities from Sheffield are beginning to look at green space in a larger way and considering multifunctional benefits in practice. At the same time, recognising a network of green spaces, authorities from Sheffield are also considering enhancing connections between people and biodiversity at a large scale.

As mentioned before, managers may manage their spaces according to differing understandings of multifunctionality in order to deliver specific management outcomes. Through interviews in Yuci, the Deputy Director of Jinzhong Landscape Department understood green infrastructure to include “*park roads (pathways in parks, gardens), plants, garden design and the basic infrastructure in green space, such as water supply and drainage*”

system.” He pointed out that the important elements in green infrastructure are landscape design or landscape architecture, planting strategies and landform. According to this notion, he considered urban green spaces as the green lung of the city to solve urban environmental issues, such as reducing carbon, exhaling oxygen, clearing the air, and creating a more comfortable pleasurable environment for people. According to his view, managed urban green spaces could provide many services such as recreation, enjoyment of urban living and disaster mitigation.

In Yuci, one interviewee has recognised that urban green spaces could bring multiple benefits, especially to improving the quality of the urban environment and services for people. However, he speculated that the idea of green infrastructure is not a required stage in the current development process in terms of planning policies and practices. The interviewee stated that the concept of landscape multifunctionality is not yet established in China, although it has emerged in recent plans and policies. Conversely, they preferred to use the notion of “green space system” for managing their urban green spaces. This is evident in governments from national to local levels promoting the Green Space System Plan to manage and develop urban green spaces in planned cities. Local authorities hope to achieve more benefits and quantity of green spaces in their city via the Green Space System Plan. For example, one interviewee from Yuci has acknowledged that, “... *it must specify how to improve the role of green space in the city via a green system plan, such as urban green as part of urban infrastructure, like water supply, gas supply, public transport, post and telecommunications, greening... all those are urban infrastructure.*”

In this respect, interviewees from Yuci provided a slightly weak understanding of green infrastructure. In this instance, practitioners’ understanding is generally learned from their personal knowledge and practical experiences. As mentioned previously, practitioners and managers in China have acquired these ideas based on their work in practice.

Table 6.2.5 summarises the understanding of multifunctional green infrastructure from interviewees in both Sheffield and Yuci. According to this table, authorities and managers in

both cities have considered that green infrastructure contains wide benefits and values for people. In Sheffield, local authorities and managers managed their spaces for quality and value. They believed that their spaces were managed not only for a high standard of maintenance, but also to bring more benefits, such as economic opportunities, social activities and cultural and environmental access, similar to the model promoted by CLERE. Overall, it appoints that practitioners from Sheffield have potentially reflected the notion of multifunctionality as promoted by CLERE. Biodiversity and ecological benefit have essentially been recognised as important in the management process by practitioners, including benefits for wildlife, connective waterways, and the “air conditioning” system for the city (cooling effect). These elements have been presented in the Sheffield Urban Green Space Strategy. Further, interviewees also considered the green spaces to contribute to the liveability and health of communities and neighbourhoods, and creating a setting for business and for attracting people.

In Yuci, authorities and managers realised the importance of green spaces for urban environment and wellbeing. Evidently, interviewees understand that landscape multifunctionality is first and foremost closely related to human services, but also contains scientific interest. Nevertheless, the Head of Planning and Policies Section in Jinzhong Landscape Department points out that everything is related to economic and social aspects in the development of urban green spaces and more recently housing prices and land values. However, they also believe that urban green spaces are helping to impact on the environment, for example, improving microclimate, reducing noise pollution and saving the lung of the city.

Recent, practices and policies in China display greater interest in environmental issues, like low carbon by government (Bank, 2011). In this regard, authorities from Yuci are trying to increase urban green spaces in the urban area. However, this process is generally focused on quantity and physical context: local government is putting a vast amount of resources into increasing new parks with a high quality of construction.

Hence, as discussed above, values of urban green spaces in urban areas have been reflected in practice. Local authorities and managers have improved their professional knowledge to

achieve and retain more values from managed sites. Like one interviewee from Sheffield mentioned, local people are passionate about protecting and enhancing their valued urban green spaces. Indeed, public urban green spaces act as a place where people can meet and share experiences and get to know each other (CABE, 2004b). Practices in Sheffield now reflect multifunctional notions in the management and development of green areas. Also, despite its very different background and context, Yuci's practices have also built on an emerging knowledge to develop quality of management for multiple functions and benefits. The knowledge of multifunctional management therefore has been considered in various ways in both areas.

Views from Sheffield	Views from Yuci
GI – a holistic approach looking at how undeveloped/green spaces interact and interconnect, particularly across the city	GI - refer to green space system Multifunctionality - not popular in China now, but emerging in green system planning; primarily about humans, with less emphasis than before on scientific and cultural values, and more on economic and social values
Social aspects - Recreation or health benefits for communities and environmental benefits - Impacts on businesses, and the setting for business and the setting for attracting people to the city - A key part of the economic force of the city - Access for biodiversity and also for connectivity and potentially also for waterways	Social aspects - Provide recreational spaces for urban living, to rest (recreation) and enjoy (visual landscape) - Make people feel comfortable and content - Cultural connotation, such as artistic quality, practicability - For disaster (especially earthquake) mitigation (n.b. in China disaster prevention must now be incorporated into green system plans, and specific advice given in parks);

<p>Physical aspects</p> <ul style="list-style-type: none"> - Heat island effect the cooling effect from green spaces has an impact on the “air conditioning system” of the city - Contributions to water management systems and energy production systems. - The biodiversity context of green spaces needs to be considered not only on sites but also might be beyond the city regions or large swathes of connected sites within it 	<p>Physical aspects</p> <ul style="list-style-type: none"> - The basic infrastructure in green spaces, such as water supply and drainage system... - Includes park roads (pathways in parks, gardens), plants, garden sketch and landform - Site for disaster mitigation - The green lung of the city: reducing carbon and exhaling oxygen, air cleaning, improving microclimate, reducing noise pollution
<p>Ecological aspects</p> <ul style="list-style-type: none"> - Benefits for wildlife - The biodiversity context of green spaces across the city region or large swathes of connected sites within it 	<p>Ecological aspects</p> <ul style="list-style-type: none"> - Landscape plants (vegetation)

Summary

Management requires core professional knowledge and skills about landscape multifunctionality which includes evaluations understanding of resources, maintenance skill, and analysis of the status of green/open spaces. Based on their different knowledge and understandings, authorities and managers reflect different dynamics and approaches to landscape management.

For example, in Sheffield, local authorities recognised the need for an ability to develop strategic management plans, to coordinate action in the sites context of green spaces. For example, one interviewee from Parks and Public Realm Section in Sheffield's Parks & Countryside Service has mentioned,

“... and obviously if it's an off-road cycle network that means it's probably going to be going through a lot of parks and countryside spaces. So again, that is another kind of transport network that could be developed which develops green links. Off-road cycle links and walking routes for people and what we'll be focusing on is the benefits of linking residential areas to

economic zones, so residential zones to economic zones could be a priority of that project...”

The Sheffield example shows how the development of skills and professional knowledge has been recognised and promoted through relevant policies and actions. For example, the Sheffield Urban green Spaces Strategy (GOSS) promoted a programme to provide staff training and knowledge for the improvement of quality management. It includes a schedule for training, and which provides additional education and support programmes to improve professional skills, link to management practices.

In different systems, managers and authorities have to deal with the rapid development of green infrastructure which could bring a major landscape change, rewiring, new skills and knowledge.

On individual sites, site managers may focus on specific management features that require professional skills, such as plant and facilities maintenance. In this case, the management team has to ensure it combines the right professionals, such as skilled gardeners, tree surgeons and facilities managers.

Conversely, as Huang et al (2009) mentioned, the management of green spaces in China is not simply following the same path of western experience. Especially due to extremely rapid urbanisation, natural and ecological systems are changing. This situation currently arises in the city of Yuci which has been described in chapter 4. Local authorities and managers have to face new landscape conditions in a short time, given the speed of change in urban green spaces. In this case, the local authorities have realised the importance of professionals and the concept skills. For example, Deputy Director of Jinzhong Landscape Department considered that “... *The first is lack of professional knowledge about management and maintenance of green spaces from our staff. Just this one issue, for example, they don't know the pests and diseases...*”

This concern is also reflected in governance and planning approaches. For instance, in

Sheffield, managers seek to manage in ways that deliver multiple services. One interviewee from the Parks and Public Realm Section said “... *I guess, my understanding of green infrastructure is related to the idea of multifunctionality of green spaces. En... so I guess, from a benefits perspective, we are not just looking at it from a perspective of recreational and community use of green spaces...*”

The Head of the Parks and Public Realm Section also suggested that, “... *the benefits of what you said in terms of social benefits, how the sort of green spaces contribute to the liveability of a neighbourhood or a site whether there are green links and have green links accessibility. It's that sort of environmental benefits and in terms of then the nature conservation part of it. The health, the sport, the sort of ... the feel of the area... I think then in terms of how it impacts on the businesses, and whether the setting for business and the setting for attracting people to the city in terms of location.*”

Based on their understandings of green infrastructure and multifunctionality, they manage their urban green spaces to increase multifunctional services. The Sheffield Standard provides an example of how knowledge and understanding is reflected directly in planning and policy-making. Thus, the Head of Parks and Public Realm Section in Sheffield explained, “... *our understanding of quality is based on ... professional standards that we have developed over many years really. And that comes from the traditional parks management background and their park professionalism which is obviously through experience and training and education of people*”

Different professional understandings lead to various management approaches. In Yuci, the Landscape Department is trying to increase the quantity of green spaces in urban areas to improve the quality of urban living. Further, based on their particularly cultural understanding, managers and authorities consider one key point of landscape management to the harmony in the built environment, especially focusing on specific design of public spaces (Yin, 2005). For example, as one interviewee mentioned, local government invests a high level of resources to invite high quality designers to design new parks and green spaces, and excluding a scheme

for long-term management. Most views of landscape management at city level stay at the stage of decision-making, and on securing new development in the city.

In general, authorities and managers should have a degree of professional knowledge and skills to manage and develop their urban green spaces. With different knowledge and understanding, management approaches are promoted in different ways. As discussed above, local authorities manage their spaces to deliver multiple functions or to increase the amount which is maintained to a high standard.

6.4 Conclusion

The purpose of this chapter was to investigate some significant factors and opportunities, through analysed experiences in the two cities. This aim examined how green infrastructure was developed in different backgrounds, and to analyse how practitioners practiced in the management process. This chapter therefore, based on the analysis in Chapter 5 and interview feedback, has been analysed to understand their unique management perspectives and impacts of authorities in the process.

Both in Sheffield and Yuci, local authorities have developed their urban green spaces over a long term with different approaches. Each city developed the urban green spaces within different contexts. In Sheffield, urban green spaces present more rich types for providing ecosystem services in sites that are covered by vegetation. Further, development of urban green space in Sheffield has aimed to promote multiple services and benefits for people with a variety of green spaces, not only developed designed parks and open spaces. In Yuci, there are less types of urban green spaces in the area. The development of urban green spaces in the city is tended to favour formally designed sites like parks and gardens. Local authorities in Yuci prefer to increase public parks and open spaces according to a high standard of parks and gardens.

In this respect, understanding of green infrastructure is important to propose strategy and plans for improving urban green spaces in the urban area. In Sheffield, practitioners have realised that as a network of green infrastructure, urban green space can deliver multiple services and benefits for people, and have managed their spaces for multifunctionality. On the other side, local authorities from Yuci seek to increase the quantity of designed urban green spaces in the urban area, and have also realised the development of a network of urban green spaces around the urban area. In this regard, both Sheffield and Yuci have promoted plans and policies to improve the urban green spaces in the urban area, such as Green and Open Space Strategy in Sheffield and Green Space System Plan in Yuci.

During the management process, local authorities and managers directly manage their urban green spaces, and provide services for achieving management goals. Both in Sheffield and Yuci, each city has specific departments in the local council responsible for managing urban green space in the city, such as Parks and Countryside Services in Sheffield and the Landscape Department in Yuci. The specific department is organised by its local government (council), and is responsible for organising and implementing normative documents about landscape management in its own city.

In the management process, the department usually works together with other departments under the local government to achieve management, such as work with the Planning Department, Housing Sectors and Finance Department. Further, the department also works closely with professionals in both cities. In Sheffield, the department has a close relationship with other departments, and has increasingly been joining up to look at the spaces between managed spaces and access by people. In Yuci, the Landscape Department has to coordinate with other departments in cross-departmental working context.

Relevant groups, friends and communities, as non-government organisations are particularly considered to work together with the local government. In Sheffield, the department has worked with a range of groups and Friends in the landscape management process. In this process, the Parks and Countryside Services, retains a legal responsibility to manage sites and

relevant groups offer support and advice to the department in managing local sites. Further, the department also realised that community involvement was generally a case of communities talking the initiative in approaching the department rather by themselves than being led.

In Yuci, there are some policies to encourage communities involved in the management process, but these policies are not promoted proactively by local authorities. Currently, only a few groups have emerged and are associated tourist attractions (such as beauty spots), but there are few in respect of landscape and green spaces.

This chapter has also analysed how knowledge impacts management of multifunctionality and green infrastructure in both cities. Management of green infrastructure requires core professional knowledge and skills, such as understanding of resources, maintenance skills and understanding of the status of green spaces. Based on the knowledge and understanding, authorities and managers reflect diverse dynamics and management aspects. For example, in UK, the CLERE model has been promoted in the management process to provide multifunctional management notions. Local authorities from Sheffield have recognised that understanding of green infrastructure lay in looking at holistic kinds of spaces and providing multiple services as a green space network. In Yuci, the local authorities managed their spaces to increase the quantity of urban green spaces for improving quality of urban living. Additionally, most views of landscape management from local authorities are staying at the stage of decision-making in the city level, and on securing new development in the city. Thus, authorities and managers should have a degree of professional knowledge and skills to manage and develop their urban green spaces.

To sum, this chapter has explained some experiences of management for multifunctional green infrastructure in both cities, and has also explored a series of commonalities and differences of experiences from management practices. These experiences have been used to understand potential gaps, such as relationships with partners, communities, knowledge of green infrastructure, and levels of experience and expertise.

Chapter 7: Comparison and Discussion:

Knowledge exchange for delivering multifunctional management

7.1 Introduction

This chapter presents two sets of evidence to identify the scope for sharing experiences of managing green infrastructure between different settings. As described in previous chapters, a key difference between traditional and emerging green space management is the promotion of multifunctionality. Thus, not only do green spaces cater for amenity and recreation, they also deliver a wider range of human and environmental functions. Hence, the first part aims to explore how to deliver multifunctional management in different practices through current experiences from management practices in both Sheffield and Yuci. This section contains four aspects of key factors in delivering quality management. The second part reviews shared experiences from both cities to indicate future development with commonalities and differences.

In the first part, the first issue explored was the understanding of aspects of promoting standards for quality and quantity. It is important to recognise different approaches and understandings between quality and quantity, and the way that different circumstances impact on them.

The second point, through evaluating policies, is to investigate potential management factors in the development of multifunctional implementation for green infrastructure. Two themes were studied to explain the effects of policy changes. Knowledge of managing green and open spaces is important to directing practices and understanding. This study found that policy changes have impacted on the development of relevant knowledge in landscape management

practices. Also, policy change impacts on skill development and supply of resources, which are important to effective management and measure of green infrastructure.

The third aspect addresses the issues considered by managers in green space management. This information helps practitioners to know ways of achieving multifunctional green infrastructure, as opposed to the management practices associated with traditional park management. Also, features, resources and aspects of management present various actions to ensure stewardship with a long-term view.

Finally, in the first part, monitoring processes are explored, as they help managers to reflect on issues for future development. Monitoring might also lead to various outcomes, such as increasing resources, and may be used to assess the effectiveness of working practices of managers and relevant groups in the implementation process.

The second part evaluates these shared experiences, which are used to promote the idea of landscape management for multifunctionality in both cities. This comparative study therefore provides a basis to assess the delivery of quality management within different contexts.

7.2 Delivering multifunctional management

Within different contexts (or development backgrounds), the achievements of quality management appear to occur in various phases. Chapter 6 has discussed how local authorities and managers consider quality of management to be a driver for enhancing their green and open spaces. Their experiences of management provide potential opportunities to investigate long-term management for green infrastructure. Hence, this section contrasts the experiences of delivering management in Sheffield and Yuci.

7.2.1 Management for quality and quantity of green and open space

During delivery, measurement and monitoring phases, quantity is an important driver at certain times (CABE, 2010c). Low average amounts of green space may mean that none is available within some neighbourhoods. Hence, knowing the quantity of different types of green spaces helps support managers to identify demands amongst neighbourhoods. Therefore, authorities and managers are always trying to ensure sufficient quantity.

The city of Sheffield, as the greenest city in England, has been a rich experience of developing and managing green spaces. The Local City Council has a series of policies and plans to increase the quantity of green and open spaces such as the UDP, Green Space Strategy (1993) and GOSS (2010). Moreover, the measurement and monitoring of quantity have been promoted for a long time. As discussed previously, each site has a management team to maintain the quantity of green spaces in a good condition in Sheffield.

In Yuci, local authorities and managers have realised that the city needs more green and open spaces to provide services for people and to improve the quality of the urban environment. They have considered increasing the quantity of spaces in the urban area. For example, as Green Space System Plan affirms, the city of Yuci will establish 735 ha parks and ensure a per capita green space standard of 15 square meters (Jinzhong City Government, 2009b). Moreover, this plan also proposes a ratio of no less than 70% of green space in each park. In here, the Deputy Director of Jinzhong Landscape Department points out that the city of Jinzhong (Yuci urban area) needs to improve the quantity of green and open spaces, as there is a gap between the rate of increasing green and open spaces and the demands of people.

For monitoring and measurement, several indicators focus on the quantity of green spaces in China. For instance, the Standard of Planning and Management for Urban Parks in Shanxi Province in China (2010) has been developed from the Urban Green Regulation (1992) and Urban Greening Measure for the implementation in Shanxi (1996). It clearly sets the percentage of green space at not less than 70% in a site of Comprehensive Park, and public

buildings and play grounds are a maximum of 10% for a city in Shanxi (The Shanxi Provincial Government, 2010c). In this case, the monitoring team will survey the spaces to check achievement for reaching standards.

However, these standards in China lead the management actions approach to focus on quantity rather than functions or quality. These standards do contain some factors for measuring quality and services, but these had to be based only on physical quality.

One simple example to show the importance of quantity of green and open spaces is by determining a distance buffer. Both in Sheffield and Yuci, governments have promoted accessible standards to measure the context of access to green spaces. As discussed in the 5000 m x 5000 m cases in Chapter 5, 300 m walking distance is taken to determine service coverage of green and open spaces in urban areas. Local authorities can use this measure to understand existing layout gaps.

Of course quality of green and open spaces is the other important aspect. Not all green spaces deliver services for people. Therefore, authorities and managers have to identify what services and benefits could be delivered from their spaces supported by measurement and monitoring.

Hence, each city has its own special implementation mechanisms to achieve their aims and visions from plans and policies. Furthermore, as mentioned in Chapter 5, both these two cities have somewhat different indicators and measurement standards to help local departments to measure the quality of green and open space and management performance.

For example, in Sheffield, authorities perceive quality with assessment tools such as Green Flag. Their understanding of quality is based on professional standards that have been developed over many years and developed from a traditional parks management background, and updated through experience and training and education.

As one interviewee mentioned, there are various viewpoints on quality, partly in the

perception of the individual; for example, some people might like the hard landscape or the soft landscape, or a wildlife area or a well-manicured and maintained area. Hence, quality varies according to the understanding of the customer, and what they are seeking from that space. In this regard, the local authority in Sheffield is concerned with quality of green and open spaces with how people use spaces and how satisfied they are with them as a place to live or play.

As standards for quality, the Green Flag Standard and Sheffield Standard are promoted to assess the quality of individual green and open spaces. Performance indicators are therefore considered to check the context and performance of implementation. Sheffield City Council has developed a reporting system to ensure that implementation is proceeding. For example, they report the results of indicators to the council's senior management team. These reports also refer to the executive management team, which is the Chief Executive and political leaders in the council.

Sheffield Standard, as the local standard for measuring quality of accessible green and open spaces in Sheffield, is used to assess each site in the city. The Sheffield Standard uses the sub-criteria of the first three elements of the Green Flag Standard to score sites and it seeks to ensure these are met across the board. By 2013, the department has taken the number meeting the Standard around the 50% mark (up from about 30%) and will reach a stage where nothing falls below that baseline.

Sheffield City Council has produced a report on "Assessment of Open Space, Outdoor Sports and Recreational Provision for Sheffield" (Sheffield City Council, 2008b). This report seeks the adequate provision of accessible, high quality open space, sport and recreation facilities. It aims to meet the needs and aspirations of local communities, local people and people who work in or visit the city. For example, Map 7.2.1 shows all the accessible open spaces according to quality, in Sheffield, as monitored by the City Council. This is an example of how local authorities manage and monitor their spaces for improving quality.

This audit considered the provision of a range of open spaces across Sheffield and provides evidence of quality. It proposed the use of SDF and GOSS to guide future investments in open space. Through this audit, the local authority gained a general vision about the quality of green and open spaces in the city. Currently, the Department in Sheffield is producing GIS maps of quality across the city, originally taken from this audit, and has started re-assessing all those sites against the Sheffield Standard. Further, managers in Sheffield also aim to promote other standards and indicators in practice, such as FSC accreditation for woodlands and institute standards for sports pitches.

Correspondingly, in Yuci, there is also a series of standards to measure the quality of green spaces from national to local level. The monitoring process is normally held by the higher department (from provincial level or national level), for example in relation to the monitoring Star Park Award. The local department has a section responsible for monitoring and measures the condition of green spaces in Yuci city. For instance, they check the condition of green space to ensure that maintenance is proceeding well and that the site is not damaged by people.

On the other hand, local authorities in Yuci realise that they need to improve the quality of green and open spaces with services. However, as the Deputy Director of Jinzhong Landscape Department mentioned, it is not like Green Flag in UK there is no national standard specifically for the quality of urban green spaces. Likewise, they realised the qualities of green and open space should contain a sensible road system; planned and designed with high standards and high maintenance, like keeping green spaces clear, neat and uniform, through construction, fertilisation, watering and pest control.

Overall, the quantity and quality of green and open space are important aspects that have been realised and promoted in practice. However, within different development contexts they have been implemented in different degrees. As table 7.2.1 shows, the particular views of Sheffield and Yuci present differing understandings.

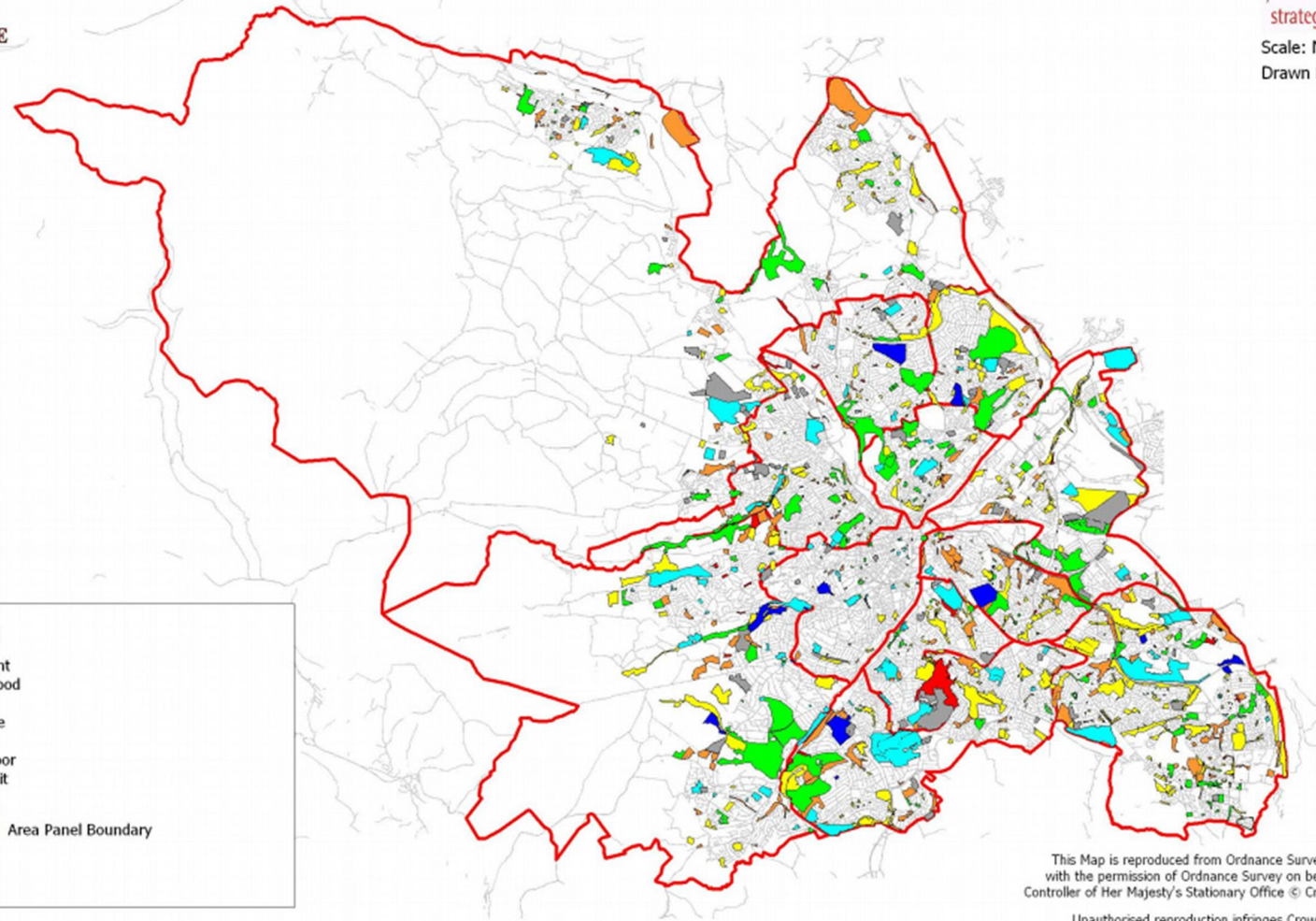
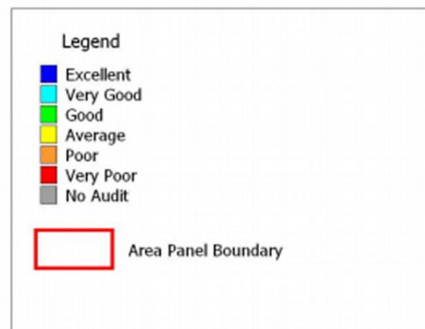
In Sheffield, the understanding of quality by the Local Authority generally comes from a traditional park management background and is concerned with people's feelings and how they use their spaces. For instance, Table 7.2.1 summarises quality strongly and recognises the importance of basic factors, such as making people feel safe on site. In contrast with Sheffield's experience, the landscape department in Yuci is concerned with quality in terms of a highly maintained condition. They realise that quality of green spaces and services should be improved in their spaces. At the same time, local authorities from Yuci also believe that high quality of green and open space mainly depends on good planning, design and maintenance, such as a well-planned road system.

Table 7.2.1: Quality and Quantity for delivering management		
	Sheffield	Yuci
Quality and Quantity	<ul style="list-style-type: none"> ● Based on professional standards and coming originally from a traditional parks management background and the associated professionalism through experience and training and education ● Concerned with how people use spaces and how satisfied they are with them as a place to live or play etc ● Important to have the basics of making people feel safe on the site 	<ul style="list-style-type: none"> ● The quality of green spaces and the quality of park services for people need to improve ● Good planning of a sensible road system ● Good management and protection against encroachment either by the government or other developer; ● Maintenance (or conservation), to keep green spaces clear, neat and uniform, through construction, fertilization, watering and pest control
Standards and policies	<ul style="list-style-type: none"> ● An increasing reference to national assessment tools, such as Green Flag ● The Sheffield Standard is about addressing public concerns about sites as well as our professional judgement 	<ul style="list-style-type: none"> ● No national standards for the quality of urban green space ● Green space system plan ● Recently National Awards provide indicators for quantity and quality (as managed condition)
Preference in practices	<ul style="list-style-type: none"> ● More of a focus on criteria, getting more sites to the Sheffield Standard as local level rather than national level 	<ul style="list-style-type: none"> ● Quantity of green space is often deficient and city needs increase quantity

Sheffield City Council



Scale: NTS
Drawn By: DJB



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Sheffield City Council 100018816, 2008.

All Accessible Open Space by Quality

Map 7.2.1: All Accessible Open Space by Quality in Sheffield (Source from: Sheffield City Council, 2008b)

7.2.2 Effects of policies for achieving management

The phases and approaches of landscape management are guided by policies. Different policies with specific purposes and understanding of functions for urban green spaces could produce diverse outcomes through landscape management. At the same time, effects from landscape management also reflect on policy-making and policy changes. This illustrates mutual impacts on improving or obstructing enhancement of green infrastructure.

On the other hand, it is the detail of management, which, in landscape, reflects the understanding of multifunctional green infrastructure. It includes managed features, managing actions and the focus of management. According to these various contents, the management of green infrastructure might have different outcomes. This section therefore reflects on these contents for further development of management.

7.2.2.1 Management knowledge promotion

As observed in Chapter 6, understanding management, professional knowledge about green infrastructure, multifunctionality and quality of landscape are totally reflected on relevant policies and actions. Conversely, the policies and practices of landscape management are influenced, in turn by developing knowledge. It has also been suggested that the development of parks and urban green spaces is often low on the list of local government priorities (CABE, 2004a). Where there is a lack of political support and commitment to the provision of quality green and open space, management may lack resources and continuing professional development opportunities. Therefore, it needs to stay responsive and relevant with active understanding of policies and actions (CABE, 2010b). This understanding enables green space managers to respond with more relevant and better actions.

Management of multifunctional landscape can be found reflected on policies. In England, it has been widely considered in planning and policies, such as the NPPF. For example, the

NPPF states that local authorities should “*set out a strategic approach in their Local Plans, planning positively for the creation, protection, enhancement and management of networks of biodiversity and green infrastructure; and maintain the character of the undeveloped coast, protecting and enhancing its distinctive landscapes, particularly in areas defined as Heritage Coast, and improve public access to and enjoyment of the coast.*” (Department for Communities and Local Government (DCLG), 2012b, Paragraph 114). This offers a clear direction for work to planners and managers. It promoted approaches for conserving landscape and scenic beauty in range of landscape and conservation of wildlife. Of course, as mentioned before, policies also evolve in more local practice, for example TEP has shown in respect of Green Infrastructure in the Northwest of England (The Environment Partnership (TEP), 2008), and as green infrastructure is promoted by the Landscape Institute in the UK (Landscape Institute, 2009b).

The change of policies impacts as the recognition and management of landscape. Sometimes, it brings more opportunities to encourage and invest development of urban green spaces or change the direction of management. For example, the NPPF provides definition of green infrastructure and promotes the need to ‘establish a strong sense of place, using streetscapes and buildings to create attractive and comfortable places to live, work and visit’ (DCLG, 2012b). This requirement will clearly impact on practices of developing green and open spaces in England.

Experiences from Sheffield

The city of Sheffield is an example where quality of management has been promoted for improved multifunctional green infrastructure, and policies have also been established in a green space strategy. The council has been focused on the development of green spaces with policies acknowledging the issue for many years. As Chapter 5 noted, since 1993, Sheffield City Council has produced a Parks Regeneration Strategy for the management of parks and open spaces in the city. This impacted in important ways on the management of parks and green spaces in Sheffield, showing a shift in the thinking about the delivery of parks and green

space services (CABE, 2005a).

Also, the green space strategy provides ideas to conduct design, management and maintenance principles (CABE, 2005a). It also developed an implementation programme, which includes monitoring and review procedures. This development provides a framework for managers and guides the management of parks and green spaces over the long term in Sheffield.

A further innovation was developed through the Sheffield Green and Open Space Strategy in 2010. Planning and management of green and open spaces now follows the GOSS to achieve an overall vision and enhance quality. According to this process, the recognition of quality green spaces is pursued by the GOSS to bring multiple benefits and improve the knowledge of management. Based on GOSS, Sheffield City Council managed its spaces as multifunctional landscapes, as the CLERE model promoted. The GOSS promoted a series of actions which reflect multifunctional aspects. Further, improved knowledge from managers is ensuring that notions of multifunctionality are brought into the management process.

Understanding of green infrastructure and multifunctionality is based on different practices and guidance from policies and plans. As found in Sheffield, the local authority and managers participate in research and innovative practices which improve their professional understanding and skills. For example, Manor Fields Park, in the Manor housing estate in Sheffield, has been developed from formerly derelict land and transformed into a multifunctional landscape asset (Landscape Institute, 2011). This park contains a wide range of wild spaces to regenerate landscape areas for multiple services, including play, walking, and space for wildlife. The pursuit of landscape multifunctionality was noted by one interviewee from Sheffield's Parks & Countryside Service:

“We’ve done a lot of projects around multifunctional spaces. So, for example, we have Mount Pleasant Park which has ground source heating under the playing field which services the local school. Across at Manor Fields we have a sustainable urban drainage scheme... which provides biodiversity benefits to the park but it’s also obviously providing a water management

benefit to the properties as well...”

Likewise, managers in Sheffield present a good understanding of multifunctional green infrastructure. They work widely with communities in the planning and management process, and exchange experiences, as promoted by GOSS. As the CLERE model promoted, multifunctional management is undertaken with the wider communities in ways that achieve multiple benefits. For instance, the University of Sheffield, as one key partner of Sheffield City Council, provides opportunities to exchange knowledge and experience from policy change and management practice. Through this process, both communities and managers gain related understanding and experience.

In an interview, the Head of Policy and Projects Section from Parks and Countryside Services pointed out that the Department is looking at management plans and area management for developing functions or benefits together as part of a multifunctional approach.

Experiences from Yuci

Similarly, in China, in order to provide quality services, the changes in policies and actions provide opportunities to improve relevant knowledge and understanding of landscape management. For example, local authorities and managers have to ensure that relevant knowledge and skills are available to derive government documents, standards, criteria and baseline studies. The Jinzhong's Landscape Department in Yuci manages parks and green spaces in urban area and audits “Green Stamp”. As one interviewee from the local department described “... *In the management process, such as the management of Green Line, management and maintenance of green spaces, (the local department works) to establish some standards ... where the best space is ... or its quality...*” (Deputy Director of Jinzhong Landscape Department, Jinzhong). In this case, practices of managing and developing green spaces are following government documents.

Hence, the policy impacts on approaches to planning and management. Indeed, local

authorities have to deal with various government documents, guidance and baseline in China. In China, policies about green infrastructure are mainly at the national and provincial level, where there are Urban Green Regulations; in Shanxi, there is an urban greening measure for implementation. However, it is not the same as UK practice, which enjoys plenty of guidance and case studies, and a more flexible implementation framework providing a range of actions for local authorities and managers. In China, local authorities and managers take their obligation to deal with all government documents as laws, bylaws and regulations very seriously. The Deputy Director of Jinzhong Landscape Department noted that their management and planning principles are based on the National Ministry of Housing and Urban Greening Management Regulations. The approaches of management are strongly impacted by changes to a policy. As discussed in chapter 5, in Yuci, landscape management approaches are changing as the Garden City Award is promoted by the Central Government in China.

Moreover, as indicated in chapter 6, practitioners in China prefer the notion of green space systems rather than green infrastructure. This recognition is reflected in government documents and therefore promoted and accepted by many local governments. It is manifested in various policies and governmental documents, which have been explained above. On the other hand, based on the requests of the National Garden City Award, local governments have developed Green Spaces System Plans with a series of policies modified to reflect changing national policy. The Jinzhong government and Yuci District government therefore invest many resources in development of green and open spaces.

According to the National Garden Award indicators, local government encourages bringing more green and open spaces with high quality design and planning into the city, and provides quality spaces to deliver a sense of place for people. Also, it provides an opportunity to encourage a range of highly qualified personnel in the development process, such as inviting professional groups to design and build new parks, such as Jinshang Park.

Table 7.2.2 presents a summarised comparison of policy and planning roles in Sheffield and

Yuci. In this table, there are marked differences. In Sheffield, the knowledge of green infrastructure has been concerned in the planning and management stage. It potentially influenced further plans and policies such as Sheffield Development Framework, sustainable urban drainage, flood risk mitigation, green links, biodiversity and other green infrastructure concepts. In Yuci, the notion of green infrastructure in policy and planning are mainly presented at the national level. However, based on national policy, planning and policies at each level influence approaches to landscape. The green space system plan, as one planning approach is promoted by the government at different levels for enhancing green and open spaces at appropriate scales. Furthermore, planning and policy are important to set the framework and provide protected green and open space for management by local government. For instance, local government in Yuci has its Urban Greening Management and Implementation Proposal, and these have clear indicators and requirements which relate to planning, construction and management, and thus aim to avoid landscape damage. Overall, knowledge of green infrastructure has a close relationship with policy and planning for enhancing practice.

	Sheffield	Yuci
Approaches of policy and planning	<ul style="list-style-type: none"> ● Looking at area based approaches to land management, at GI within the area plans, and at the policies which have been set by the planning authorities for area-based working ● GOSS reflects multifunctionality and GI aspects ● Management planning seeks to upgrade the functionality of sites 	<ul style="list-style-type: none"> ● Policies about GI are mainly at the national level such as Urban Green Regulations ● Based on National policy, in each level, there are policies for landscape, such as Urban Greening Measure for implementation (Provincial level), Urban Greening Management and Implementation Proposal (City level) ● Promotes Awards with indicators from national government to local council ● Prefer Green Space System rather than GI; it reflects in planning policies, such as Green Space System Plan ● Green Space System Plan proposes parks accessibility at each scale

Landscape department in policy and planning process	<ul style="list-style-type: none"> ● Influenced planning policy documents such as Sheffield Development Framework, pushing sustainable urban drainage, flood risk mitigation, green links, biodiversity and other green infrastructure concepts 	<ul style="list-style-type: none"> ● Design, planning and policies is important to set framework and provide the protected GS for management
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7.2.2.2 Skills and resources

Policy appears to be developing to create opportunities to give resources and bring benefits for improved management and skills. This effect is also helping landscape managers to gain political support. The policy impacts operated by green infrastructure and multifunctionality is helping local authorities to think more about sources of revenue and capital funding for green space (CABE, 2005c).

Experiences from Sheffield

In England, councils have great autonomy to determine their services and are currently facing a reduced resource context. Barber has mentioned that managers need skills to compete for attention and funds with public services which could be in critically short supply in some areas (Barber, 2007c). Policy changes impact on prospects for seeking resources. The NPPF focused interest on economic regeneration in planning notion. This change is influencing resource available to landscape development and management. For example, the Head of the Policy and Projects Section from Sheffield's Parks and Countryside Service said that it could impact on the political debate on priorities, and could severely curtail the availability of resources. It also might invest and improve some facilities, not least because of the natural lifecycle of facilities and their associated funding requirements. The Landscape Institute therefore encourages landowners to think about green infrastructure's need for both capital and resources for ongoing management and maintenance (Landscape Institute, 2013). Similar, CABE (2009c)

reinforced that both capital and revenue budgets will be needed for long term management.

Sheffield City Council promotes opportunities to develop the network of resources and skills for delivering a range of skills training (Sheffield City Council, 2010a). As previously described, the planning and management of green and open spaces generally follows the Sheffield Green and Open Space Strategy for achieving their vision. This strategy provides a scheme to improve professional skill for staff, managers and relevant community members and young people.

Site management plans are therefore used to assessable resources for achieving management visions. The systematic management of green and open space is developed in different ways with different understandings and policy direction.

The influence of budget has been studied by CABE, specifically noting that the difference between cutting budgets and making efficiency gains is not always appreciated (CABE, 2006b). Currently in Sheffield, the local authority is concerned about significantly declining resources and aims to undertake work differently to achieve greater efficiency within the current context. One interviewee from the Park and Countryside Service suggested that the future might be a little more difficult because of the changed policy conditions. In this case, the local authority might be more open to the idea of land swaps such as allowing developers to build on green space, in return for alternative sites. Some practitioners think that a kind of statutory formula prescribing a minimum level of funding for green space is needed, whilst some also cite the lack of a national agency as an issue.

Experiences from Yuci

In China, almost all parks and open spaces are managed and funded by the government. Development of green space is public welfare so landscape projects have to rely on government investment. In Yuci, the local government puts a lot of resources into developing and investing in a series of projects to improve the quality and quantity of parks and green

spaces. This situation largely depends on policy support because having a relevant policy provides rights and opportunities to gain resources from the government.

As mentioned previously, positive policy changes are increasing the supply of resources and creating opportunities to enhance the development of green and open spaces. For example, 'awards' can help to release funds. The city is pursuing the National Garden City Award and is entering the International Garden Exposition in Beijing in 2013, both of which will trigger investment. Furthermore, the Deputy Director of Jinzhong Landscape Department also noted that,

"... Every year, we have a strategy plan based on the five year plan. So in this year, our plan involves building the second stage of Jinzhong Park, new Shehuo Park, Botanic Garden, and some street greening. Others are key projects selected by our local government (Jinzhong City Council). ... Therefore, the funding is included in the annual budget and managed by the financial department of the city. This year, we have more than three million RMB funding for green spaces. ..."

Local government also has to deal with extra investment for better development of green spaces. The Head of Planning and Policies Section from Jinzhong Landscape Department reported that: *"... Now, government also promotes this (social group investment). They do not want to spend money and want to run more through market-orientation. For example, there is one hundred acres of space to develop a new park. The Developer can use five to eight acres to build buildings for business and must use the other space for a park (the developer spends the money). The government had no money, no other way (to invest in management of green spaces)."*

Moreover, the role of policy also importantly supports managers to implement projects, giving them legal rights and enforcement powers. However, there is a key gap between policy and practice, which is the lack of sufficient planned space. Planners do not understand green spaces very well, and plans are not achieving accessibility criteria. Although there are many

regulations for development and management of green and open spaces from national to local level, they are not same as law. For example, the forestry department has forest law; the planning department has spatial planning legislation; the housing and urban-rural construction bureau has more laws. But for landscape, only some regulations exist for urban green spaces and urban greening, which provide different powers in the implementation process.

In that context, the barrier to effective management is that local authorities cannot stop damage to public parks, and can only ask for green spaces recoups and could give warning or notice to avoid damage. Hence, this reflects a potential need to improve public understanding of green and open spaces and gain more support from policy and right related to landscape management.

Officers in the Landscape Department in Jinzhong have recognised this issue and have attempted to strengthen their values in the system of policy-making and implementation. For example, the Head of Planning and Polices Section in Jinzhong Landscape Department said that *“We already suggested the key problems to our council: first is improper planning, and the other is monitoring is not in place.”* The landscape department in Yuci, therefore, working to apply a method to rectify the lack of social green spaces in institutional and residential areas, which requires the developer to pay a compensation fee (based on expenditure per square metre) if the site has not reached at least 35% coverage rate, and this money will be used to build new green spaces on other places where sufficient non-developed land still exists.

Similar to Sheffield, in Yuci, local authorities have recognised the value of resources and community involvement. Development of green and open spaces at the city level in China is generally reliant on government investment. Annual budgets have been planned, based on annual action plans from annual working scheme. However, local authorities and managers are feeling the lack of funding support and expect stronger political support such as the policy for achieving the National Garden City Award. *“Once our aim is to achieve the National Garden City, it must increase investment, then green space will be increased... also bringing benefit for improving green infrastructure.”* as the Head of Planning and Polices Section in Jinzhong

Landscape Department commented. Another interviewee from Yuci also considered financial issues that impact on implementation. For example, project funding is always delayed, even where a project has been provided by the planning department and consolidated into the financial budget (Deputy Director of Jinzhong Landscape Department personal communication).

7.2.2.3 Summary

In sum, management of green and open spaces is impacted by changes in policies. Effective management requires systematic and comprehensive policy support. The relevant policies show different ideas for future directions, which could guide local authorities and managers to manage their spaces with different emphases.

Sheffield City Council has devised a GOSS with a series of themes. Resource support and development of professional skills have been recognised, especially to gain opportunities for further development. According to this situation, local authorities and managers in Sheffield have ideas to manage their spaces as multifunctional green infrastructure.

In Yuci, based on government documents and policies support, the local authorities and managers manage their spaces with ample resources. The Landscape Department in the local council, therefore, has plenty of funding from government to develop new parks and new landscape squares. Yet the local department in Yuci also recognises the lack of skills for managing and maintaining their parks and green spaces. They hope to develop their professional research skills and enhance knowledge for staff (Deputy Director of Jinzhong Landscape Department, Jinzhong, personal communication).

Therefore, the changing policy vision is helping to transfer the landscape approach toward green infrastructure with multifunctional aspects, such as ecological and cultural benefits.

In general, policy development provides opportunities to promote improvement of professional knowledge. Every change of policy influences the management of green space. It includes knowledge, managing approaches and resources. For example, in China, the government develops Garden City policy to improve the quality of green and open spaces in cities. On the other hand, in the UK, the NPPF helps to encourage development of green infrastructure. Changes in relevant policies can help create or sustain resources for managing green and open space.

In general, both Sheffield and Yuci have rich experiences to deliver management of green and open spaces. From what has been discussed above, planning and policies for long-term management have been confirmed as important for delivering quality of management and provide a guideline for management works. Moreover, delivery of management is closely impacted by resources such as funds for maintenance and skill development. CABI (2010b) has found, through research, that development of green space is also significantly affected by resources and services. Reduced resources, therefore, become a challenge for maintain the quality and services expected by local people.

7.2.3 Contents of Management plans: reflected understanding of multifunctional green infrastructure

In terms of managing specific sites and planned strategies, local authority and managers need to set out their prospective visions and aims in formal documents. Different sites and strategies present various phases which reveal an understanding of how benefits and functions are being pursued and of how concepts of landscape multifunctionality are helping promoted by local policies.

In practice, most management objectives are based on policy requirement and aim to achieve the bench worthy of targets of performance indicators. As previously noted, management actions need enough availability of resources and skills to achieve the manager's vision.

Therefore, management objectives importantly depend on policy support. Also, they also closely link to the degree of understanding of multifunctionality as revealed through management practices.

Experiences from Sheffield

In Sheffield, management plans contain specific features and themes to achieve management goals at different scales. For example, at the top level, Sheffield City Council manages its spaces based on national policies and the local Green Space Strategy such as Sheffield's Green and Open Space Strategy (GOSS). The GOSS from Sheffield contains a series of proposals to develop and manage green and open spaces. The vision and aims indicate a direction for the development and management of emphasising the delivery of more benefits for people through high quality management.

Considering the management plan contents, the items are generally reflected as two parts: physical features (or conditions) and social outputs which are more concerned with people's feelings and needs. For example, one aspect of plan content is "physical condition" which is considered under the theme of Places and Environment. The various themes provide the basis for an enjoyable environment for people and the maintenance of high quality green spaces through traditional and modern management practices. Social aspects, environmental issues, natural aspects and other phases are also present in different degrees in management documents.

This approach reflects the CLERE model, aimed at managing green spaces for multifunctional and for improving physical and social functions. For example, interviewee thought that

"... So I think the role of urban green spaces is that it meets many needs. ... you know, the environmental benefits flood alleviation, access routes, but there's also these other benefits for health, well-being, communal use of space etc. So I see them as being very important and very valued by the community..." (Head of Policy and Projects Section from Sheffield's Parks &

Countryside Service)

Sheffield has a well-developed system of management plans for public parks and green spaces. The management contents in these sites therefore, are used to reinforce potential connections between multifunctionality and green infrastructure. In Sheffield, the local authority has also developed the Sheffield Standard to measure success in their management of green spaces. Through the Sheffield Standard, local authorities concentrate on manage their spaces in good physical condition, and in way that reflect the feelings and usage of the public.

Experience from Yuci in China

In China, management contents, purposes and designs again largely reflect the understanding of landscape functions and values. Managers and local authorities manage their spaces following standards and policies. At different levels, there are specific standards, assessment criteria and methods to guide managers in the design and upkeep of their spaces. For example, National Garden City Indicators provides a series of contents for developing green and open spaces in urban area, such as requiring a minimum urban green ratio of 36%.

Hence, the contents of management in Yuci reflect policy understanding. For example, the Jinzhong Green Space System Plan delivers a vision for improving urban green space spaces which aims to develop the green network to improve the city image (or self-value), increase quantity of urban green spaces for Ecological Garden City and enhance urban functions. Local authorities and managers manage and develop their spaces to achieve the aims and quantity set out in their adapted.

Based on their vision, the Green System Plan proposed a series of projects to enhancing quantity of parks and green spaces, as well as conveying, an understanding of multifunctionality. For example one interviewee from Yuci recognized that

“... Landscape multifunctionality... this is not popular in China now... but in recent years,

landscape multifunctionality is increasing in green system planning. First, of course, is to rest recreation, enjoyment, (visual, beauty landscape)... Now, another point is use of the site for disaster prevention. This is the main... concept of landscape multifunctionality. One point is provides recreational space for urban living, the other is use of the site for disaster prevention, when emergencies happen (like earthquake) ...”

Moreover, the Green Space System Plan advocates a park service radius with different scales of urban green space. For instance, there should be a street green (small green space) within a 300-500 metre service radius, a community green space within a 500-1000 metre service radius, and, if the town/city is big enough, a district park within a 1000-1500 metre service radius, and a city park within a 1500-2000 metre service radius.

Further, there has green space system plan and green line approach to delineating green spaces (similar to ‘red-lining’ of development areas) but this is not yet sufficiently respected and monitored, so it needs stronger support from planning (who have stronger statutory powers) to prevent loss of land and damage to trees during construction.

Although there are many aspects in management plans for delivering multiple services and benefits in Yuci, they are not the same as in Sheffield. There are no specific plans for site management. However, there are guidelines for traditional park management on sites. For instance, in Yuci, local authorities and managers generally follow the “Garden and Green Space’s Management, Maintenance and Conservation Assessment Method” to manage parks, green and open spaces. The content of the assessment method is used to check maintenance work, healthy of environments and effective work organization. In this case, compared with Sheffield experience, Yuci’s management of urban green spaces lays more emphasis on physical context and increasing quantity. For example, one interviewee pointed out that *“In Jinzhong, the quantity of green spaces needs to be improved. Jinzhong is a new city (in terms of political boundary), so the quantity of green space is deficit. Between the rate of green space growth and demands from people, there is still a gap.”*

As pointed out by a practitioner from Yuci, there are gaps between aspiration and achievements mainly arising due to lack of land, because of the rate of growth and costs associated with acquiring, clearing urban land. In this situation, the local authorities therefore hope to increase the quantity of urban green spaces in the urban area. In older areas, it is difficult to find space for landscape, and retro-fitting is often too expensive, especially if buildings need to be removed. In new developing areas, developers have already earmarked areas for building that would have made good public squares are which had been indicated by plans and policies.

Summary

In summary, details of management plans reflect approaches of management which include physical and social aspects of multifunctionality. Improved multifunctional management involves considering both physical and social aspects. Moreover, management of multifunctional urban green spaces also enhances and provides the local economy and ecological benefits. Management plans reveal that this is being achieved in different ways in Sheffield and Yuci.

7.2.4 Monitoring for achievement

This section discusses experiences of implementation and monitoring for development of multifunctional green infrastructure in Sheffield and Yuci. These experiences show how the cities are feeling about improvements through long-term management. Implementation and monitoring are important to address management features through measurable indicators which are explicit, planned and managed by local authorities at different levels.

As a meaningful method of assessing achievement, monitoring and review is used to measure management outcomes. Monitoring identifies aspects of management which should be updated in the light of changing circumstances. It considered ways to identify gaps in the

implementation process for achieving visions and aims. Also, the measurement and monitoring process helps to review the context for defining potential benefits and services from managed spaces. Hence, its value is to identify the potential opportunities and issues for improving multifunctional green infrastructure through specific cases.

Also CABE (2009c) reported, monitoring and measure procedures contain three features that are important to determine outputs and outcomes: key performance indicators, staff involved in the monitoring process, and monitoring schemes. This section considers these features through cases studies.

Monitoring indicators are used to measure and review the process of implementation and to check outcomes and achievements. For example, the indicators from the Green Flag Assessment apply a concept of high quality of urban green spaces. Also, though, the monitoring process is influenced by the collective professional knowledge of the monitoring team who may interpret and modify basic standards in the weight of personal understanding and knowledge.

Moreover, actions of monitoring and measurement are implemented according to a planned management schedule. A reasonable schedule provides opportunities to identify implementation issues in a timely manner. It is important to ensure the implementation is on time, and to check resources and investment as necessary. Besides, regular monitoring also helps managers and staff to understand their work processes, and needs and impacts.

7.2.4.1 Monitoring performance: approaches to identifying multifunctionality

Performance indicators are basic to monitoring, measuring and reviewing implementation and outcomes. These indicators also function to measure the responsibility of managers in their working process. CABE (2009c) has stated that indicators may measure inputs (as resource spend and investment), outputs (such as measured improvement in specific actions) and

outcomes (assessing achievement).

In Sheffield, the Head of the Parks and Public Realm Section in the Park and Countryside Service recognised that one aspect of performance indicators is to aim for sustained achievement. For example, the Head of the Policy and Projects Section noted that, *“We’ve got various, what we call, performance indicators and measures, which cascade from a part of our business plan. So the number of sites improved, or the quality assessment of sites, or public satisfaction with those sites, or the number of sites that have been managed proactively with nature conservation, are all measures that we report on ...”*

Selected indicators (or criteria) should be considered by local authorities at the local level and linked to national indicators for local authorities, managers and partnerships. One popular kind of indicator is one that can be used to measure outcomes in diverse situations. One interviewee commented on the value of such a measure:

“So picking a standard which is applicable to the majority of situations, you can then apply it and people understand it, - and they think ‘I’ll take an element of that and I’ll apply it to my park, or I can take part of that and apply it to this woodland or to an allotment area’ - or something like that, so it becomes for us a sort of universal benchmark or measure by which you can test other things and apply that against it.”

Importantly, indicators will help relevant authorities to understand how management can contribute to the long-term retention and improvement of multiple services. One interviewee from Sheffield City Council mentioned that the Sheffield Standard addressed welcoming, health, safety and security, and clean and well maintained conditions. It is used to monitor the quality of spaces for local residents and a wide range of users. According to this interviewee’s view, the Sheffield Standard is quite generic and easy for people to understand. It helps the general public to apply it to their area. It enables managers and workers to consider broad approaches through a whole site, not just a specific maintenance job.

In Yuci, the local government uses the “Standard of planning and management for urban parks in Shanxi province in China” to monitor management achievement in the city. As a provincial document, this standard has produced a series of indicators to evaluate management works from planners and managers throughout the whole of Shanxi province. The indicators from this standard generally focus on monitoring for quantity of urban green space, planting context and facilities in parks. Based on these indicators, local authorities and managers therefore manage their spaces to reach their targets.

Further, performance indicators are used to review the effectiveness of managers in the management process. For example, in Yuci, local government promotes a local standard to measure the local landscape department’s working processes for achieving Garden City Awards.

The Details of Target Responsibility and Evaluation System for Achieving Garden City in Jinzhong includes a series of indicators to monitor employees’ working status and process. It is a scoring system to check attainment and has six sections to evaluate the quality of parks and open spaces in the locality.

As stated previously, many performance indicators in different levels relate directly or indirectly to green spaces. Some indicators focus on results rather than on implementation processes and organising process. The national indicators as important indicators always lead the trend of monitoring which impacts local authorities’ performance.

In a different context, local authorities have also developed local standards to supplement national indicators. For instance, the Head of Parks and Public Realm Section from Sheffield's Parks & Countryside Service stated that,

“The council has a number of strategic outcomes which we want to achieve for people who live within the city - people who live, work in, visit the city. One of those strategic outcomes, something called ‘great places to live’ - so what they want to create are great places to live in the city - is part of that strategic outcome. There are a number of other indicators, a number of

other policies, which are about environment, and what we do then, the work we do, feeds into these...”

In both cities, effective long-term management is underpinned by sustaining resources cooperated with a monitoring process. Authorities and managers can achieve coordination through feedback from the monitoring process with appropriate indicators. Different indicators focus on specific phases, and in this way can help to reinforce the diversity of multifunctional services, and to develop a long-term perspective.

7.2.4.2 Monitoring Team: members and responsibility

Monitoring of urban green spaces requires a measurement team comprised of various members, who will come from a range of backgrounds. Most methods for monitoring use a scoring system, which may fail to capture different aspects of landscape values. Therefore, it is preferable for the team to include members with different backgrounds and understandings.

Depending on the monitoring scheme, members of the team come from different groups such as local government, friends groups, community and partners. They can bring a wide range of views to help improve quality of implementation. For example, in China, the measuring team for the National Garden City Award (called the evaluation committee) includes officers and external experts such as landscape architects, landscape managers, urban planners, urban infrastructure engineers and housing developers.

In China, monitoring actions are always organised by the government. Therefore, these selected members are considered on official group. As interviewee from Yuci stated, the monitoring and review is normally organised by higher government who are responsible for picking members of the monitoring team. He also noted that there is less self-monitoring in Yuci. According to their view, the local government in Yuci only implements the plans and strategy without specific self-monitoring. Moreover, as the Head of Planning and Polices

Section in Jinzhong Landscape Department observed, official monitoring teams at the local level may exercise less rigorous judgement and simply follow the orders from local leaders.

Regarding the Parks and Countryside Service of Sheffield City Council, a Green and Open Space Core Management Group consists of a range of key urban green space owners, managers and providers. The evaluation is used to identify the condition of sites for classification at the Sheffield Standard. However, the monitoring and review team not only include professional people (or groups) but also involve a range of people from non-government organisations. The council has recognised the importance of community involvement. For example, the Head of the Policy and Projects Section from Sheffield's Parks and Countryside Service in Sheffield City Council pointed out that,

“... We also have something in Sheffield called the Community Assemblies which is seven political areas made up of four wards each... yes... four wards each. And again, there's kind of delegation to those levels and around investment what the local priorities are and the performance measures there. It's measured on a number of levels.”

As Chapter 5 and 6 noted, these Community Assemblies work closely with their local councillors to guide and shape services and feedback. The wider community and friends' group act as advisers or consultants involved in monitoring, and valuably provide a broad range of views, and can influence budget decisions on relevant projects.

Monitoring is organised by relevant managers and organisers at different scales. As discussed above, monitoring at the city level is organised by the city council and monitoring at the site level (micro level) is usually by the city council but organised by site managers. It is at the site level that stakeholders play a liberating role in monitoring.

7.2.4.3 Monitoring schemes

Regular monitoring is important to keep a check on costs of implementation, and what can be in further implementation. It is also helpful to identify gaps in order to improve implementation in the future. Long term management and maintenance of green infrastructure have, to an extent, tended to be insufficiently considered in the past (CABE, 2006a).

According to proposals in the Green and Open Space Strategy, Sheffield City Council set the core management group to review on a rolling basis to ensure progress in the longer term (Sheffield City Council, 2010a). Through this process, strategic priorities are reviewed on a five year basis and updated accordingly. In this case, key indicators from national and local standards provide an important measure for external accountability of the Standard aims described by one interviewee,

“We do re-assessments of sites we’ve said that we were going to improve to the Sheffield Standard, and then hopefully will do those improvements once we’ve identified the sites. And then a year later, or when these improvements have been implemented, we’ll go back and do a re-assessment of that site, and see how it scores compared to how it did in the past. And following that we have periodic audits of sites which can give a kind of three to four yearly check on the condition based on the quality map of the city.”

The annual process of assessment for the Green Flag Award will similarly assist in the review of sites (Sheffield City Council, 2007a, 2009b, c). For example, Weston Park’s Management Plan stated that:

“It will be reviewed each year to enable feedback from park staff, users and stakeholders to be fed into the management of the park and to ensure that any changes in council policy and legal requirements are addressed.” (Sheffield City Council, 2009c, P. 17)

In sum, through regular review and monitoring, managers can take time to understand the

views of others, involve relevant partners in the process, and consider the potential for further management (CABE, 2005b).

7.2.4.4 Summary

Monitoring and review helps managers to ensure that practitioners are achieving their management aims successfully. Further, monitoring also helps to identify issues and opportunities for improving management, implementation effectiveness, and crucially, introducing new ideas and policy priorities.

Within different contexts, each city has many measuring indicators to monitor their urban green spaces. Practices in Sheffield are mainly considered Green Flag Award standard and Sheffield Standard to monitor quality of green and open spaces in the city and classified in different levels such as national level and local level. In Yuci, local regulations usually used to measure the context of green and open spaces in the urban area. As promoted by central government, national awards, such as National Garden City Award, strongly encourage the measurement and development of urban green spaces in cities.

Members of the monitoring group should include a range people from different backgrounds, as this leads to better understanding and feedback. Members with professional knowledge bring better understanding relating to technical and policy aspects. Involvement of the wide community in the process of monitoring can ensure that experiences and news from users and visitors are included. By this process, comprehensive feedback benefits to identify gaps in implementation, investigated potential opportunities for further development and bring more resources into management.

Regular monitoring is an opportunity to attain understanding of achievement and feedback on time. Through regular monitoring, it is possible to identify potential opportunities and issues from the process of implementation and management in a timely fashion. A planned

monitoring process also enables managers and members of a monitoring team to make the best use of and further develop monitoring indicators. Moreover, in local government, a planned performance monitoring scheme is useful to measure working staff performance.

However, within different contexts and backgrounds, recognition of monitoring is undertaken through various approaches. In Sheffield, regular monitoring is conducted within a role scheduled by the local authority itself. The Council develops a self-motivated initiative to review their plans, management and implementation. By contrast, in Yuci, the monitoring and review process is normally undertaken by a higher authority in Yuci. For instance, the local department adopts indicators to achieve the National Garden City Award and Provincial Garden City Award; then, the Bureau of Construction of Shanxi Province and Ministry of housing and urban-rural development of People's Republic of China will evaluate and monitor the city. In this situation, regular measurement and monitoring largely depends on the higher government.

7.3 Discussion: seminars and difference in knowledge and experience

This section reflects on the composition of knowledge and experiences of delivering landscape management between Sheffield and Yuci. The general nature of green space management and role of authorities were illustrated and discussed in chapter 6. Based on the experiences of local authorities in Sheffield (UK) and Yuci (China), factors influencing the management of multifunctional green infrastructure have been identified.

This section reflects on the findings, in particular, actions of similarity and differences. These comparisons and contrasts can internally contribute to mutual learning and knowledge exchanges:

Part 1: Convergent experiences

- Influences of knowledge development
- Impacts of policy and planning on management
- Importance of resources to sustained quality
- Measurement and Monitoring: standard and indicators

Part 2: Divergent experiences

- Role of central, regional and local authorities in management
- Aspects of managing multifunctional green infrastructure
- Monitoring

The ways in which traditional green space management has been moving towards a more multifunctional approach and to emerging conceptions of green infrastructure, has been related to the CLERE model (Barber, 2005). CLERE can help managers and authorities to identify their skills and service performance gaps as discussed in previous chapters. Emerging knowledge and concepts are making important impacts on practice and performance in green space management. Thus, experiences of managers afford opportunities for improving further practice, and they will be discussed in the following sections.

7.3.1 Convergent experiences in urban green space management

7.3.1.1 Influences of knowledge development on landscape management practices

The first area on commonality relates to advances in knowledge in green infrastructure and landscape management. It is evident that knowledge is not only for government authorities, but also for wider groups, such as green space managers, stakeholders who own spaces, NGOs, relevant neighbourhood and communities.

Table 7.3.1 summarises common considerations of knowledge to indicate the potential for

further development. It notes two aspects: knowledge about relevant concepts which are essentially related to practices; and knowledge about management methods.

Convergent notions about knowledge	Factors
Knowledge about landscape concepts in practice	<ul style="list-style-type: none"> - Understanding and recognition of green infrastructure - Dealing with managing issues - Promoting practices - Delivering services
Knowledge of management methods	<ul style="list-style-type: none"> - Management approach - Skills - Professionals

Development of knowledge about emerging landscape concepts in practice can be seen in both cities. For example, how practitioners understand the concept of green infrastructure impacts on their achievement of management objectives. In this study, understanding or recognition of green infrastructure has generally been considered important by practitioners in both cities. Some policies and studies provide their own definitions of green infrastructure, and multifunctionality. However, practitioners have not been limited by these definitions and have taken different approaches to impact more meaning in their own planning and management perspectives. For example, the understanding of green infrastructure amongst practitioners in Sheffield is not only related to the NPPF definition, but has also been closely related to positive contributions to water management, energy production systems, cooling effects from green spaces and biodiversity. It is also viewed at a cross-regional scale which might extend beyond the city or large swathes of connected sites within it.

A developing knowledge provides opportunities to manage green infrastructure for dealing with a series of complex issues, and practitioners have therefore used green infrastructure concepts to deal with a series of matters such as environmental issues, health, and livability of neighborhoods. In Sheffield, these considerations have already been promoted in the green and open space strategy. In Yuci, based on practitioners' understanding, landscape multifunctionality has been increasingly recognised in green system planning to deal with

many matters such as recreation, enjoyment (visual landscape) and disaster mitigation (e.g. earthquake).

Second, there is important new knowledge about ways of working relating to the overall management which includes management approach, changing skills and diversity of professionals. In both cities, approaches are largely dependent on recognition of landscape management challenges, relationships with participants, awareness of community involvement and cross-departmental working. Further, both cities experiences need to develop professionalism and skills to help deliver management goals in practice. These include aspects which require updating in the light of new policy challenges such as professional horticultural qualification and technical training for maintenance, design and planning. Thus, both local departments are promoting schemes to provide skill training for their staff.

7.3.1.2 Importance of policy and planning on management

Policy statements and planning actions may ultimately be expressed through plans. Practitioners from local authorities attribute three important factors to such plans:

- Providing a long-term basis for innovative management
- Linking to, and gaining validity from a considered context of policy and planning
- Bringing opportunities through resource commitments

Policy and planning provide legitimacy rights and direction for practitioners to manage green and open spaces. In Sheffield, the landscape department has realised that planning is important in the promotion of multifunctionality in green infrastructure. The spatial planning department is important to landscape management because it has legal statutory powers whereas the landscape department do not have direct legal powers. For instance, in management practices, managers are concerned that a lot of professionals in the Parks sector cite the lack of a national agency as being an issue, lack of statutory drivers around some of the aspects of green open

space.

In Yuci, officers from the landscape department also believed that the landscape department lacked power with respect to planning and enforcement. For example, in Yuci gaps between aspiration and achievements mainly arise due to lack of land, because managers may want to develop green spaces on a site, but permission is lacking. Similarly, some problems of encroaching on green spaces or damaging trees cannot be stopped by the landscape department because it often lacks power of enforcement.

Furthermore, policy and planning also have the ability to help achieve long-term visions. For example, the NPPF may lead to an expansion of green infrastructure whilst PG17 has hitherto had a significant impact, on the range and extent of green spaces provision. Also in Yuci, changed policies have brought opportunities to develop green and open spaces in the city for achieving National Garden City Awards. Hence, setting out a strategic approach in plans can influence delivery by building up support and resources.

7.3.1.3 Importance of resource: to sustained quality

Adequacy of enough resources is a prerequisite for effective management. Resources here include funds, political support and technical capacity. Securing long term funding for management and maintenance of green space is considered to be a constant challenge by practitioners (Turton and Durston, 2008).

Practitioners from both cities have found this to be a serious issue. Barber has pointed out that local authorities have to face declining resources because of national and international budgetary problems. The Head of the Policy and Projects Section from the Sheffield Parks and Countryside Service pointed out that funding has always been a challenge for green infrastructure. For example, this has particularly hampered the creation of big projects in the city.

Practitioners from Yuci also encounter the same challenges. The development of green space is considered to be a public welfare matter, so landscape projects have to rely on government investment. For instance, the Deputy Director of Jinzhong Landscape Department noted that project funding is almost always subject to delay. Although management of green space is funded by the local council and funding is included in the city's annual budget, local authorities still feel the lack of money and are keen to encourage non-government investment.

7.3.1.4 Management and Monitoring standards and indicators

Each city has its own monitoring system to review the process of implementation and to embed the importance of sustainable management over the long term. Practitioners are using many specific standards and performance indicators to measure the quality of green and open spaces. For example, the Green Flag Award and Sheffield Standard are used to assess the quality of green and open spaces from national to local level in Sheffield, whilst the 'Urban Green Line Management Method' (MOHURD, 2002), 'Criteria of National Garden City' (MOHURD, 2010c) and 'Evaluation standard for urban landscaping and greening' (MOHURD, 2010d) are national standards to measure and guide development of green and open spaces in China. Moreover, at the regional level, the 'Urban greening measure for implementation in Shanxi' (The Shanxi Provincial Government, 1996), 'Shanxi Urban (Town) Stars Parks Criteria' (The Shanxi Provincial Government, 2010b) and the 'Standard of planning and management for urban parks in Shanxi province in China' (The Shanxi Provincial Government, 2010c) are used to measure and authorise development in the construction of green and open spaces in Shanxi Province. At the local level, more specific standards and indicators are used to monitor quantity and quality landscape spaces in Yuci, such as 'Garden and Green Space Management, Maintenance and Conservation Assessment Method' (Jinzhong City Government, 2010) and 'Jinzhong Urban Greening Management Method' (Jinzhong City Government, 2011). Moreover, the local council also specifically promotes a standard to measure the implementation process for achieving the National Garden City Award.

Hence, monitoring is essentially based on reliable standards and indicators. As discussed previously, effective monitoring can help to achieve a management vision over the long term by identifying successes and addressing issues or gaps. Although there are some differences in monitoring between Sheffield and Yuci, there are also a lot of commonalities.

7.3.2 Divergent experiences in urban green space management

7.3.2.1 Role of central, regional and local authorities in management

In both cities, green and open space management is seen to be primarily managed by local government, or is a local government responsibility with the involvement of relevant partners.

Different councils have distinctive approaches to managing their spaces. Table 7.3.2 presents some differences between the two cities. In Sheffield, the relevant department is responsible for managing green and open spaces over the whole Sheffield area, from urban to rural. The department sees their role as a client relationship to cooperate with many groups to co-manage their spaces. By contrast, the landscape department in Yuci solely manages all green and open spaces in the urban area on a day-to-day basis. The department therefore has its own direct labour focus for maintenance.

Different responsibilities for managing green and open space need resourcing and coordination. The Landscape department therefore has to coordinate with other departments such as planning and finance. Furthermore, it is also necessary to manage the relationship between public bodies and private contractors. As Table 7.3.2 shows, the department from Sheffield has a rich experience for community involvement. The authority understands the values of community engagement which can bring in resources, and engage politicians' interest. In Yuci, this lack of experience has resulted in local authorities lack of interest in encouraging communities.

Table 7.3.2: Summary of role of local department in management		
Factors	Landscape Department, Sheffield	Landscape Department, Yuci
Managed area	Managing whole area of Sheffield	Managing urban area
Process	“Client”, cooperating with other groups for daily management	Responsible for whole and operation based on direct labour force
Working with communities	<ul style="list-style-type: none"> ● Work with voluntary groups and prefer to organize rather than lead ● Work with many communities and groups ● Local political interest in improvement ● Support communities in management ● Communities’ agendas are compatible with local department ● Communities value their spaces and help to prioritise and protect 	<ul style="list-style-type: none"> ● Policies are encouraged and lead by local department ● Encourage some groups to manage their own spaces ● People might not appreciate value of landscape, but there is an emerging culture to bring natural life into the urban environment

7.3.2.2 Managing multifunctional green infrastructure

The primary concerns in managing spaces to attain levels of both quantity and quality. The emphasis between these depends on local priorities of managers. Especially, in Yuci, increasing the quantity of green and open space in urban areas has been considered the priority. Of course, Sheffield is already the greenest city in England with a high quantity of green spaces.

Once a basic quantity of green space has been attained the emphasis tends to move increasingly to high quality being associated with multiple services and functions. In Sheffield, management of quality is considered at different levels: the site management plan for sites and the green space strategy at the city level contain specific approaches for achieving quality. Spaces are being managed ecological, recreational, cultural and economic benefits, and improving services for the community, in ways comparable to the CLERE model.

In Yuci, although local authorities emphasise managing quantity over quality, growing importance is attached to the latter. Nevertheless, Yuci practitioners tend to think in terms of high quality design, construction and maintenance rather than delivering services such as biodiversity, economic benefit and health services.

Broadly speaking, the three factors which vary between each city appear to be:

- Management for quality and quantity
- Management to achieve multiple functions and services
- Management for performance

7.3.2.3 Monitoring: structures

Monitoring and evaluation structures have been established to review implementation and to pursue continuous improvement of green spaces. This monitoring process has been conducted somewhat differently in Sheffield and Yuci, in terms of:

- Monitoring structure
- Monitoring organisation (members and people)
- Using the results of monitoring

The experience of Sheffield and Yuci is that monitoring is usually carried out directly by the local landscape department to review their management process. Both cities have monitoring schemes that had been planned with clear procedures. However, in Sheffield the monitoring plan not only measures performance and conditions against criteria or standards, but also contains details about timescales and other specific details. In Yuci, the local authority measures and reviews their spaces based on relevant requirements of regulations. Also, some monitoring processes are set by higher levels of government. In this situation, monitoring does not always gather information in a timely manner.

Secondly, the organisation of the monitoring team may vary, with the diversity of membership

bringing differing knowledge and understanding to the monitoring process. This has been recognised by authorities in both cities; however, the choice of personnel is different. In Yuci, participants are generally selected by government and have high level status with professional knowledge such as director of relevant departments, senior planners and experts from relevant areas. Sometimes, they may undertake monitoring on spaces where they have never visited. In contrast, monitoring of green and open spaces in Sheffield involves much more people from professionals to everyday users and relevant communities. The monitoring team members in Sheffield evaluate their spaces with professional knowledge and users experiences.

Third, through effective monitoring, feedback from identified issues can lead to continuous improvement. However, usually, specific monitoring feedback is used for a particular purpose such as the Assessment of National Garden City Award in China and Assessment of Green Flag Award in England. Even so, these evaluation processes can help to identify a wider range of gaps and potential issues.

7.4 Conclusion

This chapter has mainly concentrated on delivering quality landscape through innovative means and seeks to respond to new planning and policy agendas in different cultural contexts.

Green space development reveals slightly different purposes between the cities. In Sheffield, urban green spaces have been developed and managed over a long period cooperation with many groups. The emphasis now tends to be on pursuing new understanding of quality and retaining quantity. Yuci local authorities aim to increase the quantity of urban green spaces in the urban area and are beginning to promote multiple services for people.

Hence, this chapter has compared some key factors which characterise the two cities' approaches, namely, management aspects, effects of policy and planning, managed features and monitoring all results. Through analysis of these factors, a number of similarities and

differences emerge between the two cities.

Finally, this chapter noted the scope of experiences, and knowledge. These particularly involve:

- Influences of emerging knowledge regarding landscape management practices
- Policy development and management to achieve a wider range of outcomes
- Importance of resources to help ensure quality management
- Measurement and monitoring to ensure long-term perspectives

Chapter 8: Conclusion

8.1 Introduction

The purpose of this thesis is to explore the role of landscape management in the delivery of landscape multifunctionality and green infrastructure. To date, landscape multifunctionality and green infrastructure have been emphasised in planning and design rather than management. Hence, the significance of this thesis is exploration of the importance of landscape management in landscape multifunctionality and green infrastructure within diverse cultural contexts, especially for managing a long-term vision.

Multifunctionality has been discussed as a defining feature of green infrastructure from the literature study in previous chapters, and hence these two concepts are closely related. After exploring definitions, the thesis moved on to explore how multifunctionality and green infrastructure were managed in two cities: Sheffield in the United Kingdom (UK) and Yuci in China. The comparative case study seeks to understand how the concepts of multifunctionality and green infrastructure are understood and practiced in these two cities. This comparative study has used GIS method to map the nature and distribution of urban green spaces in each city, and interviews to elicit relevant and insightful comments from practice. This final chapter draws together the literature study and comparative case study and proposes a series of themes for development of multifunctionality and green infrastructure with respect to managing urban green spaces.

This chapter begins with a reflection of research aims, and outlines the key findings and concludes how these outcomes can be taken forward for the purpose of this thesis. This chapter reviews the research questions of Chapter 1, and the methodological framework proposed in Chapter 3 which determined the condition of landscape management for multifunctional green infrastructure in the research. Further, this chapter also includes overall findings to reflect whether the research questions have been answered and how these findings

might be used for further development. Finally the thesis reflects on similarities and differences between the two cities, and closes by reflecting on key findings, and how their implications can be taken forward and provides pointers to future research.

8.2 Overview of Findings

8.2.1 Reflection on research aims and questions

This research sets out to investigate the exploration from knowledge development in multifunctionality and green infrastructure to management practices, based on experiences of urban green space management in Sheffield (UK) and Yuci (China). This section reflects the main research issues for this thesis. The main issues are:

- Understanding of multifunctionality and green infrastructure;
- Emergence of these approaches in policy, planning and management for multifunctionality and green infrastructure;
- Comparison of understandings of multifunctionality and green infrastructure in Sheffield and Yuci, and how those understandings are put into practice;
- Distinctive features, strengths, weaknesses, similarities and differences as revealed by comparative analysis

These issues have been explored by using three methods (literature, GIS and interview) in a comparative case study to answer the related research questions in these separated steps:

- Literature review has been used to draw upon academic, professional and practitioner literature, and to establish a framework of multifunctional green infrastructure which explores the relationship between relevant theories and landscape management;
- Comparative case study has chosen two cities, Sheffield (UK) and Yuci (China) to examine the context of green space management in different cultural contexts. The GIS

method was used to understand the current structure of urban green spaces within its policy and cultural context;

- Through purposive interviews with selected practitioners from Sheffield and Yuci, the comparative case study reviewed the conduct of urban green space management, and analysed relevant policy documents at national, regional and city levels. The scope for exchange of multifunctional management knowledge was evaluated regarding the potentials of management development which can be proposed in diverse cultural contexts.

8.2.1.1 Understanding of Green Infrastructure

Through the literature review, relevant concepts were studied to understand multifunctionality and green infrastructure. Urban green space as a fundamental idea provides knowledge for establishment of green infrastructure notion, and presents various aspects of services and benefits for achievement. Urban green space is generally considered as a basis to extend to the notion of green infrastructure.

In this thesis, the review of literature from academic, policy and practice has allowed for an understanding of what green infrastructure is and how it is respected within the development process. The review therefore has defined the identification of green infrastructure and to explore common notions in practices for different areas. Through these discussions, a definition of green infrastructure with common understandings has been proposed which has been recognised by both official and academic views:

Green infrastructure is a network of multi-functional green space in urban and rural areas, which is capable of delivering a wide range of environmental and quality of life benefits for local communities.

In order to promote green infrastructure into management practices, this thesis has integrated a range of principles which have been outlined in chapter 2 (Table 2.2.9). Although these

principles of green infrastructure might be adapted to particular conditions, they are able to form a basis in practice. Hence, the principles of green infrastructure with diverse aspects contain a variety of green infrastructure features to connect people and nature together, such as ecological, economic or social features.

Multifunctionality has been understood as a core aspect of green infrastructure that can be applied at all landscape scales, including natural, semi-natural and designed spaces, as the definition noticed. Multifunctionality is concerned to improve quality of life and environment at different levels. The integrated definition of multifunctionality, therefore, is proposed as an exoteric notion in management practices.

According to reviewed research and practice, the practice of green infrastructure has been proposed in planning and policy at different areas. This thesis has reviewed the transfer of various related knowledge for understanding development of multifunctional green infrastructure, from academic, policy and practice, such as green network, green space system and ecological infrastructure. Further, according to the definition of green infrastructure in NPPF, these aspects have essentially been recognised by an English policy context which provides opportunities to propose in wide practices.

In addition, management of green infrastructure relates to the understanding of linkages and relationships between people's needs and green spaces. The management of green infrastructure is, therefore, concerned with planning and policy together, in order to improve the development of green infrastructure with a multifunctional vision.

Although green infrastructure presents a cohesive trend, it still provides scope to bring multifunctional agendas together and is advanced to an integrated green network at diverse scales. Many multifunctional green infrastructure practices to planning and design for delivery of green infrastructure, management is essentially accompanied within the development process. Landscape management importantly implies the achievement of green infrastructure.

CABE (2004a) noted that quality of green spaces does not solely rely on their initial planning and design, but also depends to a very large extent on how the initial quality is managed and maintained. The CLERE model is promoted as a tool to achieve multifunctional management goals. The CLERE model (Barber, 2005) recognises multifunctionality as ‘Community, Landscape, Ecosystem, Recreational resource, Economy’ benefits which can be delivered from urban green space. Barber (2007a) stated that this model can be used to identify multifunctionality in urban green spaces, and to help holistic management. The CLERE model is also proposed to connect knowledge, resources and activities together for delivering multifunctional management. However, this model is not clearly appreciated in practice by all practitioners, and just implied part of aspects by authorities such as identifying skill shortages, resources and approaches in management.

In general, through this thesis, understandings of multifunctionality and green infrastructure have been considered to approach the capability of delivery of multiple benefits and services for people in urban and rural areas. With these understandings, aspects of achievement can be proposed in extensive practices with planning and management by diverse authorities.

8.2.1.2 Assessing the landscape resource in two case study areas – the context for green infrastructure development

This is reflecting on research questions to assess existing urban green spaces in comparative case studies. GIS mapping has been used to show the nature and distribution of green spaces in these two cities, Sheffield (UK) and Yuci (China). The GIS mapping determined contexts as evidence was used to profile the quantity and quality of urban green infrastructure, and tried to reconcile classifications to attain a comparable picture.

Sheffield, as the greenest city in England, is relatively well endowed with a variety of green spaces. The city not only contains most types of urban green spaces, but has also developed a linkage between these spaces as a green space network. For example, through GIS mapping, it

can be seen that, Sheffield has good quality of accessible urban green spaces in the urban area.

Yuci, another case city, presents different contexts in developing urban green spaces. Through GIS mapping process, Yuci has also determined its urban green space context (in Chapter 5). As a rapidly developing city, Yuci has many deficiencies in provision of urban green spaces in the urban area. The city contains limited types of urban green spaces, and has some distribution gaps in the urban area, such as a limited quantity of green spaces, unbalanced distribution and facilities for use.

Generally, through GIS mapping process, the comparative case study has analysed the nature and distribution of urban green space in both cities. This process has provided comparable evidence for assessing the urban green space resource in two case study areas, and proposed to exposit context for green infrastructure practice.

8.2.1.3 Management for Multifunctionality and Green Infrastructure

This looked at management approaches which were used in both cities. The thesis has investigated essential motivations for multifunctionality and green infrastructure in the management process, and considered management structure, plans and monitoring, policies and resources, the role of authorities and partnerships and professionals (in Chapter 6 and 7). In this process, implementation and monitoring of management have also been assessed to reflect how achievement of management is identified in practice in both cities.

In Sheffield, management plans and green space strategies have been developed over a long term. Management practices have been promoted with a series of plans, policies and research to improve the green space quality and delivering services for people. Further, these management practices of urban green spaces also involve wide partnerships and professionals, which help to support development of professional knowledge and resource achievement. In this regard, these approaches of management, therefore, help to promote an innovation in

management of multifunctionality and green infrastructure.

In Yuci, a series of plans, policies and actions have also been developed to improve urban green spaces in the urban area, especially to increase the quantity of urban green spaces. Management practices in Yuci are particularly impacted by policy context which essentially influences understanding, management approaches and resources support, and is generally implemented by local government. In this respect, the management for green space in Yuci therefore basically depends on policy context and motivation of local government with development of understanding.

8.2.1.4 Scope for exchange of experiences and mutual learning

Through discussions in the comparison case study, there is scope to share knowledge and skills for improvement of management. There is evidence of some commonalities in experiences between the two cities, and conclusions have been made to propose improving the quality of management in different cultural contexts (in Chapter 7).

For example, a specific department (or section) in each local council is important for managing their urban green spaces, such as the Parks and Countryside Services in Sheffield and the landscape department in Yuci. The specific landscape department plays the role to organise and promote management actions in practice. It has impacts on planning and policy-making to struggle for achieving maximised resource and policy support. Chapter 7 analysed how support of policy and planning are important for delivering quality management. This effect is also considered to impact knowledge development, resources achievement, improvement skills and passion of practitioners.

Further, knowledge and skills development help to find the potential of management and promoting quality of management in practices at different areas. Although, in Sheffield, management of green spaces has been practiced with rich experiences, it is still considered to

improve professional knowledge for fitting developed views and delivery of quality services. As discussed in Chapter 6 and 7, working with partnerships and community could be beneficial to improving management vision and monitoring effective, increasing achievement of management resources.

In general, these commonalities and differences in experiences would be helpful to improve management structure, local production of management plans, improvement of partnership and community, monitoring of locally tailored performance measures, and staff development. Hence, these experiences between the two cities have learned to share in improvement of management at different areas.

8.2.2 Key Themes Emerging

This section explains particularly emerged experiences for improvement of urban green space management from practices in Sheffield and Yuci. These experiences mainly trend to highlight the prospective themes of landscape management at scales in different areas. This discussion started with recognition from practitioners and go on to analyse these key characteristics which impacting management. At last, the analysis turns to conclude transfers for management perspective.

8.2.2.1 Understandings of Multifunctionality and Green Infrastructure

This research investigated the developing green infrastructure and management of urban green spaces, and concluded this recognition of multifunctional green infrastructure is implicitly impacted driven of management approaches. These findings suggest that mainly theoretical development need to address necessarily suitable to cultural context.

The theoretical development should not only address understanding of concepts but also needs to address knowledge and skill development. Through discussion in Chapter 6 and 7, the

developed knowledge provides scope for practitioners to achieve perspective of multifunctional green infrastructure. In the UK, many studies and practices have widely explored knowledge and experiences for developing green infrastructure with multifunctionality. The experience from Sheffield shows how knowledge and skill development benefit to improve understanding and practice of multifunctionality and green infrastructure. As discussed in Chapter 6, the Landscape Institute (UK) has promoted a series of green infrastructure studies since 2009, with various research groups and cities. These research groups and councils from various cities in UK have practiced to promote green infrastructure with many projects in recent years such as CABE, CIWEM, TEP, ECOTEC and Natural England. In this respect, practitioners in Sheffield enjoy a relatively better understanding of multifunctionality and green infrastructure in practices. For example, Sheffield City Council developed the Sheffield's Green and Open Space Strategy, and proposed to achieve various benefits and services for people from these spaces in Sheffield. The Council also worked with a range groups and professionals to improve their own management knowledge and skills, such as working with the Department of Landscape at the University of Sheffield.

Moreover, the recognition of green infrastructure also needs more high level guidance and policy commitments. This is reflected from experiences in both Sheffield and Yuci, and essentially impacts on management understandings in practices. In UK, NPPF has clearly contained the notion of green infrastructure into policy which provides scopes for authorities and relevant to promoting it into practice. In this regard, green infrastructure has to be considered in practice in England. In Yuci, the Central Government of China promoted National Garden City Awards to encourage developing quality and quantity of urban green spaces in cities in China. This promotion provided opportunities for local authorities to improve their professional knowledge for achieving the standards of the National Garden City Award. In this situation, the local government from Yuci has improved its urban green spaces in the urban area, and also improved understanding of urban green spaces in the process.

Further, a better understanding of multifunctional green space helps to improve management.

The CLERE model is a helpful framework for understanding multifunctionality and identifying skill shortage, resources and multifunctional approaches in management. Combined with the notion of the CLERE model, multifunctional approaches can be directly reflected through management vision and contents. Therefore, multifunctional green infrastructure has to depend on developed knowledge in management practices with understanding and recognition from practitioners.

Additionally, understanding of multifunctionality and green infrastructure is essentially related to quality and quantity of green spaces. In a context of rapid urban development, ‘quantity’ seems to be the priority, but a process on quality of new spaces is also necessary. Yuci has proposed the Green Space System Plan to develop urban green spaces in the urban area, and essentially focused on improving the quantity of urban green spaces. However, quality of urban green space has also been considered in new development of urban green spaces, such as proposed high quality of planning and design at new parks and green spaces.

In general, this theme concluded theoretical development for understanding of management practice, and has proposed to address knowledge and skills development, policy commitments support and proposed approaches from the CLERE model with quality and quantity development.

8.2.2.2 Importance of strategic planning

The importance of strategic planning for the management process is generally considered as a policy support setting out responsibility and priority of management for developing urban green spaces. As discussed in chapter 7, landscape management is essentially undertaken by the landscape department and cooperated with relevant departments and communities to achieve policy support, resources and knowledge provision.

In this respect, management needs higher level policies to give mandate and help release

resources. Practitioners from landscape departments were presenting different approaches in urban green space management. For example, in Yuci, The Landscape Department has to cooperate with relevant departments. Although there is a strategic plan for future development of urban green space, called Green Space System Plan, the plan proposes to improve urban green spaces in urban areas with diverse land use conditions. Therefore, the importance of management needs to be coordinated via spatial planning. Further, quality of management also needs strategic visions for landscape management plans, and is proposed to achieve management goals. All these experiences help to create a holistic approach for improving management and achieving management goals with policy supports.

8.2.2.3 Management structure

Management for multifunctional green infrastructure is not a single approach, as has been discussed in previous chapters. Integrated management is promoted to achieve a multifunctional vision. The CLERE model gives a vision of how landscape management can be more holistic and integrated for further management.

Within different management structures, aspects of management present various ways to achieve management goals. The Sheffield experience provides evidence of the value of collaborative management with local organisations and communities which might bring support and resources for management practices, and could potentially be learnt by Yuci.

On the other hand, management structure needs to match enough resources and budgets to provide necessary needs in management. For example, management practices are generally funded by local government in Yuci which is an expression of the importance of policy support and significance of government support with these resources. Although there are different management structures between Sheffield and Yuci, this experience of resource support can also be learned by local authorities in Sheffield.

Finally, this theme has realised that there is not a single approach for future landscape management, but an integrated management proposed diverse approach in management structure to show ways of improving quality management at diverse cultural context, as the CLERE model proposed. Thus, the management approaches are proposed to consider multifunctional ideas in management practice.

8.2.2.4 Importance of monitoring

Importantly, monitoring can help ensure attainment of long-term goals. This thesis has shown values of standards and performance indicators for improving management in practice. Through analysis in chapter 7, significant features of monitoring are discussed to achieve effective monitoring for management of multifunctional green infrastructure. Standards and performance indicators have been recognised as monitoring criteria which are essentially endorsed by local authorities at different levels. Additionally, a series of performance indicators not only help to identify conditions of green space management, but also provide ideas for local authorities to target future priorities in management.

The thesis has also identified the benefit of a diversity of groups in the monitoring process and regular monitoring with time scales. Although the monitoring process and structure are different between Sheffield and Yuci, the potential impact on actions and aspects of monitoring, and reviews are common. However, the valuable experience from Sheffield shows the value of involving a diversity of groups in the monitoring process which bring wide approaches and understandings rather than one sole professional understanding.

In short, the importance of monitoring has been explored to draw approaches for achieving management goals over the long-term. This notion is proposed to address the value of monitoring standards and performance indicators, and also promoted importance to identify conditions of management and potentials for further priorities. Further, the monitoring process should also involve a diversity of groups with wide knowledge and understandings of

landscape management.

8.2.2.5 Two way transfer of knowledge

One purpose of this research is to explore 'knowledge exchange' as a way for improving knowledge and management practices between two different cultural contexts. This thesis has delivered a series of themes for potential exchange between Sheffield and Yuci. Some commonalities are not only proposed at Sheffield and Yuci, but also propose to introduce for practice in other diverse cultural contexts.

Although there are major cultural and political differences, experiences from both cities have particular values to share for improving landscape management. For example, these shared experiences are valuable for developing knowledge about green infrastructure, improving monitoring and organising labour, proposing use of awards, and concentration on long-term management planning. Further, achieving effective resources, especially funds for management, promotes more attention into the government's vision. Further, practices from Sheffield also provided experience to show how long-term management planning benefits the delivery of quality of green spaces.

8.3 Final Reflection for Future Work

This research finishes with critically reflecting on approaches of the research, which could be improved and also concentrated on findings from this study. This section reviews the research design, methods and outcomes from this thesis, and also poses some beneficial suggestions for the future.

8.3.1 Reflections on the research aims, process and methods

8.3.1.1 Research scope and perspectives

This research has taken a comparative case study to explore the development of landscape management, which is essentially beneficial to improving multifunctionality and green infrastructure. The research perspectives are addressed in this research to determine these issues for delivery of emerging management of green infrastructure and multifunctionality in two cities, Sheffield and Yuci. In this respect, this thesis concentrated on understanding knowledge of multifunctionality and green infrastructure and approaches of management in practice. This research has also considered comparative analysis to reflect on distinctive features, strengths and weakness and commonalities and differences of experiences.

8.3.1.2 Review of the methodological structure

The methodological structure has been developed in Chapter 3, which provided a number of research methods for achieving research aims. This research reviewed a range of literature to understand relevant knowledge and to determine the relationship between theoretical knowledge and management practices. This review has assessed literatures from academic, policy and practice. Through this process, the theoretical framework is not only developed from academics, but also contained many practice experiences.

This thesis has used a comparative case study to seek potential of management for multifunctionality and green infrastructure in diverse cultural contexts. Sheffield in United Kingdom (UK) and Yuci in China, therefore, have been studied.

In order to understand current structure of urban green space within its cultural and policy context in these cities, GIS mapping has been used to identify nature and distribution of green spaces in the urban area, and also has tried to reconcile the classification of green spaces for providing comparable information (Chapter 5, 6 and 7). During the GIS analysis process,

some detailed information is not collected and analysed, due to unavailable data. This GIS analysis, therefore, might have potential to improve in future, such as data about green spaces in residential areas.

Further, purposive interview as a feedback method has been approved to achieve understanding of implementation and monitoring in practices. Through interviews with selected practitioners, this research has importantly learned various experiences together to evaluate the potential of management at different cities. However, this research only interviewed a limited number of participants with limited questions and achieved finite feedback to understand research aims. Thus, the future development could be considered to involve more participants.

These methods in the comparative case study used within this thesis provide a depth of information that enabled the research questions in Chapter 1 to be analysed and taken forward to future development.

8.3.1.3 Recommendations for transfer of knowledge

Through these experiences from the comparative case study, there is scope for investigating the delivery of landscape management emphasis on landscape multifunctionality and green infrastructure, and transfer of knowledge in practices at diverse cultural contexts. The following recommendations are considered to propose improvement of landscape management in diverse cultural contexts for development of green infrastructure and multifunctionality.

1. Development of theoretical framework potential helps to improve knowledge and skills and staff development in practice;
2. Experiences are valued to promote working with communities and groups, encouraging communities involved in the management and monitoring process;
3. To achieve effective resources for delivery of management, from government, relevant

groups and communities and volunteers, especially, achieving government support with ensured funds and budgets;

4. To propose authorities' views to address management of green infrastructure, and promote management approaches to political vision and planning proposals;
5. To develop local production of long-term landscape management planning.

8.3.2 Potential for future work

This thesis has concluded a number of themes to explore how landscape management benefits to enhance multifunctionality for green infrastructure. However, there is still more that could be studied in further research.

1. The understanding of knowledge can be researched in more depth from a theoretical development with literature study. Although this study has reviewed a range of literature from academic, policy and practice, it still needs to identify different changes of knowledge around green infrastructure practices at different cultural contexts, and ensures the role of management can be linked with theoretical development. Especially in China, it is necessary to deal with policy changes and emergent green infrastructure approaches for management practices.
2. The comparative case study was limited in time and resources. This research only considered in city level to determine contexts of urban green spaces in Sheffield and Yuci. In this respect data limitation, in particular, impacted to measure the quality of urban green spaces, such as physical health data in Yuci, traffic data in both cities and data about green space in neighbourhood areas (housing areas). Hence, the analysis of accessibility and quality might not exactly match real context. Further study could include views with more detailed data to examine the relationship between physical context and mental health with management issues.

3. Monitoring of management could be explored to identify the future evaluation from development of monitoring standards and performance indicators. This thesis only depended on relevant documents and interviews to review the process of monitoring, and therefore missed out on field investigation, which should bring more information for identifying management priorities further.

4. Finally, further study could bring more interest to meet the composite needs into holistic management approaches with common vision in practices. Green infrastructure as a broad notion in landscape, supports ecological, economic, social and cultural and historical interests, and can be concerned to deliver effective management with quantity and quality in diverse cultural areas.

In addition, most importantly, further research on the landscape management of urban green space could contribute significantly to improve knowledge development, policy support and working with communities in practice, and to deliver a notion for long-term management planning in management practice.

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Appendices

Appendix.1: Documents for National Garden City in China

Criteria of National Garden City 国家园林城市标准指标体系 (2010)

This is a national standard to guide cities get the level of garden city and win the name and funding. Planning and management, Green spaces construction, Monitoring are three aspects which are valued cities to achieve the standards of garden city.

There are nine points in planning and management aspects. For example, it must have landscape or greening management department in local government. Specific funding must be set for management and maintenance. The city should have research ability for improving and marketing green spaces. Green system planning must has been done before apply the name of garden city. On the hand, management of green line and blue line are other two points. Digital database also should be set up. Social survey should be done and degree of satisfaction should have eighty percent.

In the part of green spaces construction, there is a physical indicator that applicant must achieve the standards. For example, the percentage of green spaces in the urban must be no less than 36% and have potential opportunities to achieve more than 40% in the future. The third point is a value assessment which gives a series of points to measure the quality of green spaces in the city. For example, it has indicators to measure functional assessment, cultural value assessment, wildlife assessment and conservation of diversity.

This document also has parts to show veto index and some index explanation.

Application and Criteria Method for National Garden City

国家园林城市申报与评审办法 (2010)

This document is together with the document of Criteria of National Garden City. It is an explanation of how to apply and evaluate a national garden city award. The application scope is all cities with a municipal government (city level).

The condition for application has five points. First, local government must has set up objectives and planning actions to achieving national garden city award. The actions must have been implemented at least three years. Second, the applicants also should achieve at least II level which evaluated based on evaluation standard for urban landscaping and greening (2010). Third, the applicants already practice and achieve the provincial garden city award at least two years. Fourth, there must have not damaged landscape and green spaces, ecological environment conservation, urban infrastructure and urban management in recent three years. Fifth, if the city has gained I grade in urban landscaping and greening evaluation and already

achieves the name of national garden city at least three year, it can applies the national ecological garden city.

The National Garden City Award holds every two years and even-numbered years for the reporting year, odd-numbered years for the assessment year. The applicants must submit their application documents before thirty September in the apply year. The application documents include local government's application, opinion from provincial planning and construction department and GIS data.

The first step process of application is the local governments submit their application to Ministry of Housing and Urban-Rural Development. Then the provincial governments organize preliminary examination and submit their opinion to Ministry of Housing and Urban-Rural Development. The municipality directly under the Central Government can directly submit their applications to central government.

The members of evaluation committee are including officer and experts from landscape architects and manager, urban planner, urban infrastructure engineers and housing development. The evaluation process includes four steps. First step is checking the application documents. Second step is questionnaire in the city of applicant. Third step is field survey and the last step is integrative evaluation. After these four steps, the result will be published on their website for ten days.

Appendix.2: Interview Questions

Interview Questions

Theme 1: Understanding of concepts of green infrastructure and landscape multifunctionality

- What do you understand by the term ‘green infrastructure’?
- What are the elements that you consider to constitute green infrastructure?
- What do you understand by the concept of landscape multifunctionality?
- What do you understand the role of urban green spaces to be?

Theme 2: Understanding of quality of urban green spaces

- What do you understand by the idea of ‘good quality’ in urban green spaces?
- What has informed your understanding of good quality of urban green spaces?

Theme 3: Local authorities’ roles in landscape management

- What is your department responsible for in the landscape management process?
- Which other departments does it work with in local government in the landscape management process?
- What is the relationship between your department and these other departments?
- Which other organizations are involved in the landscape management process?
- In what way does the local authority work with those organisations?
- What is your role in this work of the department, and in liaising with other departments and organisations?

Theme 4: Management structure in the management process

- Could you explain the organization of landscape management (structure) in your department/local authority?
- Which sections are most important to the promotion of multifunctionality in green infrastructure and why?
- What is the relationship between the landscape management and planning in the department (local authority)?

Theme 5: Management policies for Green Infrastructure

- How do you think management, as opposed to planning, policies are helping to promote green infrastructure in your local authority? For example, are they helping to make green spaces more connected, more multifunctional, and more actively connected to community and economic needs? Are you revising management specifications to reflect this? Are you collaborating with other departments and organisations to add value to their green infrastructure

policies?

- Which of your current policies and plans focus on the green infrastructure, both directly and indirectly?
- Please can you give some specific examples of your policies, plans and other measures which help to emphasise green infrastructure?
- Do you think there are any gaps or omissions in current policies?
- Are these gaps being addressed by the department? If so, how?

Theme 6: Implementation and monitoring

- How do you monitor and measure the degree of implementation and performance of your policies?
- Are you able to cite examples of successful implementation of policies relating to green infrastructure, especially those which relate to landscape management practices, and which show innovative ideas and methods?
- What do you see as the main reasons for 'gaps' between policy and practice, or between aspiration and achievements? Can you identify specific examples of problems?
- How do results from performance monitoring feedback into improved implementation in the future?
- Is there evidence of resistance amongst staff towards changes in landscape management practice related to the promotion of multifunctional green infrastructure?

Theme 7: Other opinions

- What do you see still needs to be done?
- Have you anything else you would like to add?
- Have you any questions of me?

Final Summary

If you were to tell someone in other city (Sheffield/Yuci) about your landscape management practices process,

- Which three things would you say work well?
- Which three things would you say could be improved?
- Is there anything you would tell them not to do?

Appendix.3: Explanation Sheet for Interview Questions

Explanation Sheet

Introduction

This explains the organization of interview questions. It is divided into seven themes. Each theme has specific topics and aims to achieve specific understanding of landscape management from participants.

Theme 1: Understanding of concepts of green infrastructure and landscape multifunctionality

This theme explores how participants understand certain concepts. Especially in the UK, the Landscape Institute has produced Green Infrastructure Guidance to support landscape practice. On the other hand, the green infrastructure concepts are internationally acknowledged to help improve quality of green spaces by landscape practitioners. In the UK, it has been encouraged in the planning system, for example, PPG 17 aims to promote quality of open spaces. However, policy and practice guidance tends to be related to planning rather than to the management. Therefore, this theme is trying to find out landscape managers' recognition of these concepts.

Theme 2: Understanding of quality of urban green spaces

This theme purposes to develop an understanding of the natural quality in green spaces, and how it might be promoted, measured and monitored by practitioners. Different understandings of quality of urban green spaces may lead to different results and actions by practitioners. For example, CABE Space in the UK has produced a series of publications aimed at investigating and improving the quality of urban green spaces.

Theme 3: Local authorities' roles in landscape management

This theme aims to understand how local authorities work in the landscape management process. It seeks to understand the relationship between the relevant departments (and organizations) and other parts of local government and to understand the role of participants in their organizations. This is useful to investigate opportunities to improve the quality of management in the future. It also helps to recognize the study of management structure. The roles of local authorities and participants in the landscape management process are strongly linked with the management structure.

Theme 4: Management structure in the management process

This theme aims to know the structure of management in the local authorities in the studied cities. It is not only trying to find out the structure of landscape management in local authorities, but also attempting to investigate the most valued parts of the structure from the participants'

point of view.

Theme 5: Management policies

This theme seeks to investigate how specific landscape management structures facilitates the introduction of management policies and practices that might lead to changes in the qualities of green infrastructure. Therefore, it aims to know what emphasis (actions and targets) are promoted to improve/enhance multifunctionality in green infrastructure through management policies. It is an opportunity to identify gaps in current policies and plans from the participants' perspectives.

Theme 6: Implementation and monitoring

This theme aims to know how these policies and plans are being implemented by local authorities. For example, how local authorities work in the implemented process to achieve the policies and who is in charge. Implementation is the way to achieving policies' targets. It is the direct impact of landscape management in practice. There may be differences between procedures in documents and practice (the "policy-implementation gap"). On the other hand, monitoring of implementation may help to check the result of implementation and improve it in future development. Therefore, it is necessary to understand the system of monitoring, especially from the practitioner's view.

Theme 7: Other opinions

This part is an opportunity to exchange information and cover any issues which participants' consider to be pertinent. They may have additional comments which did not covered into the previous themes.

Appendix.4: Yuci Urban Green Spaces in city centre area							
Classification	Code	Name	Area (ha)	Green space area (ha)	Water area (ha)	Built time	Open time
Comprehensive park	1	Yuhu Park	16.08	9.11	2.69	1996	1996
	2	Lingshang Park	5.94	3.21		1983	1983
	3						
Community park	1	Yingbing Lvyuan	3.40	2.00	0.09	2007	2007
	2	Yingbing Yiyuan	1.14	0.93		1999	2007
	3	Station Park	1.54	1.31	0.02	1982	1982
Linear park	1						
Street greens	1	Fangyuan Green	3.47	3.10		1999	1999
	2	Yutou Green	5.94	5.94		2006	2006
	3	Qiaonan Green	0.12	0.12		1989	1989
	4	Linyun Green	0.18	0.18		2001	2001
	5	Ti'nan Green	0.18	0.18		1995	1995
	6	Tianhe Green	0.66	0.66		2007	2007
	7	Jiaotong Green	0.29	0.29		2006	2006
	8	Xiao Beimen Green	0.22	0.22		2001	2001
	9	Seven & Six Green	0.29	0.29		1997	1997
	10	Yuhu street green	0.06	0.06		2001	2001
	11	Kewei Green	0.09	0.09		--	--
	12	Land department Green	0.08	0.08		--	--
	13	Golden Triangle Green	0.08	0.08		--	--
	14	205 Green	0.53	0.53		1999	1999
	15	Zhongdu south road green	4.23	4.23		--	--
	16	Station south road bridge green	0.33	0.33		--	--
	17	Subbranch of Peony Bank, south green	0.02	0.02		--	--
	18	Lian shui ge green	0.04	0.04		--	--
	19	Yiyuan quarter green	0.05	0.05		--	--
	20	Sifeng street Oil green	0.03	0.03		--	--
	21	Wang cun turntable green	0.15	0.15		--	--
	22	Xiao he river green	0.06	0.06		--	--
	23	Agricultural college	0.13	0.13		--	--

		enclosure green					
	24	Specialized hospital gate green	0.13	0.13		--	--
	25	Shunxi green	1.05	1.05		--	--
	26	West rotary island	0.37	0.37		--	--
	27	Xiao wanghu turntable green	1.79	1.79		--	--
	28	Wanghu green	3.75	3.75		--	--
	29	Dingyang road & Wenyuan street Intersection green	0.61	0.61		--	--
	30	Sport street small woods green	0.07	0.07		--	--
Specialized park/ theme park	1	Sports park	30.46	23.25	0.49	2007	2008
	2	Wujinshan forest park	3667			--	--
Country park	1					--	--
Urban square	1	Yingbing square	3.23	1.12	0.16	1991	2002

Appendix.5: Desk work of Data Collection				
GIS Data Name		Sheffield	Yuci	Description
Physical data		Available	Available	
01	OS Maps/Master Maps			As a base map, it should have boundary and landscape form...
02	Land use boundary with name			
03	Land cover data			Type of land use for master map
04	Transportation			Road, railway, path and public assess
Social survey data				
05	Historical resources			Historical
06	Health rate			Health percentage link to urban green space location
07	Housing development with wards			Housing land Housing marketing price (cover urban green space)
08	Education statistics			School, Education base
Demographic data				
09	Population data with Wards			--
10	Age structure with Wards			--
11	Population density			--
Environmental data				
12	Climate Data with Wards (like annual temperature record et al)			--
13	Water resources			--

Appendix.6: Collected Data in Sheffield	
Organization	Name of Dataset
Ordnance Survey	Master map
Ordnance Survey	HLC maps
Ordnance Survey	1:10000 color raster
Ordnance Survey	Boundary data
Ordnance Survey	1:10000 Land form map (CAD)
Sheffield City Council	Wards Population Profile 2009
Sheffield City Council	Health Profile Summary 2009
Sheffield City Council	Crime Profile Summary 2009
Sheffield City Council	Local Plan data
Natural England	National Nature Reserves
Natural England	National Parks
Natural England	Agricultural Classification
Natural England	Countryside Park
Natural England	Ancient woodland
Natural England	Grassland network
DEFRA/www.naei.org.uk	1x1km emissions of NO _x in 2007
DEFRA/www.naei.org.uk	1x1km emissions of N ₂ O in 2007 (tonnes)
DEFRA/www.naei.org.uk	Land use statistics 2006
Sheffield City Council	City Centre Bicycle Parking
Sheffield City Council	Sheffield Parks
http://casweb.mimas.ac.uk/2001/start.cfm	Sheffield health data
http://casweb.mimas.ac.uk/2001/start.cfm	Sheffield employment/unemployment data
http://casweb.mimas.ac.uk/2001/start.cfm	Sheffield economic activities data
http://casweb.mimas.ac.uk/2001/start.cfm	Sheffield crime data
http://borders.edina.ac.uk	Sheffield boundary data
Sheffield City Council	List of current management plans in Sheffield

Appendix.7: Collected Data in Yuci	
Organization	Name of Dataset
Jinzhong Local Government	Master map
Jinzhong Local Government	Green System map 2009
Jinzhong Local Government	Land use map (CAD) (1: 1000)
Jinzhong Landscape Department	Green spaces data
Jinzhong Forest Department	Woodland and forest data (in countryside area)
Jinzhong Forest Department	Official report about forest and works 2010
Jinzhong Landscape Department	Statistics of parks and open spaces in central urban area 2009
Jinzhong Local Government	Demography data 2008
Jinzhong Police Office	Population with wards (neighborhood)
Jinzhong Landscape Department	Green system plan

Appendix.8: Full assessment criteria for Sheffield Standard

Full assessment criteria for the Sheffield Standard

Sites for Sheffield Standard uplift are chosen year-by-year based on the score they receive when they are initially assessed. The tables below show the 13 criteria of the Sheffield Standard and the sort of things assessors look for when they visit the site to score it.

Scoring

Very poor	Poor	Fair	Good	Very Good	Excellent	Exceptional
0-1	2, 3, 4	5, 6	7	8	9	10

Criteria	Points to consider in scoring
1. Welcoming	<ul style="list-style-type: none"> Is the site easy to find? Is the main entrance obvious, clean, safe, open and well-maintained? Is there lighting? Is there any graffiti? Does the site 'welcome' a wide range of users? Is it safe to access by road; are there pedestrian crossings? Does the site look attractive?
2. Good and safe access	<ul style="list-style-type: none"> Is the site clean and tidy? Are the entrances clear or are they overgrown? Is there provision for cycling? Is the site clear from blockages (including drop curbs and free from overhanging branches)? Are access points level? Is there any damaged infrastructure? Are the access routes defined, weed free and clean? Are work areas and waste storage areas screened-off?
3. Signage	<ul style="list-style-type: none"> Is there any signage and is it effective? Are all entrances clearly signed? Is there a clear number to contact and is the owner/manager of the site obvious? Is there a map? Are messages on the signs friendly, welcoming and appropriate? Are the signs damaged or with graffiti? Are the signs visible? Are there any community notices?
4. Equal access for all	<ul style="list-style-type: none"> Can mobility scooters and wheelchairs have access? Are there tap rails/interpretation, handrails, steps, etc. for partially disabled users? Are there disabled parking bays? Are there bus/tram routes with stops close to site? Are there toilets and/or a café? Are the paths good quality? Are there easy-going trails and guided walks?
5. Community involvement	<ul style="list-style-type: none"> Is there a friends group or other supporters? Is there a variety of people using the site and for different activities? Are there volunteer days to improve the site?

	<ul style="list-style-type: none"> • Are there any activity walks or sports events? • Is there a school nearby? • Is there a park/site watch scheme?
6. Safe equipment and facilities	<ul style="list-style-type: none"> • Are there any fixed items (bins, benches, walls, buildings, playgrounds, fencing, etc.) and are they safe? • Are the dangers cordoned off? • Are there any other site hazards?
7. Personal security on site	<ul style="list-style-type: none"> • Are the site lines clear? • Is there a feeling of personal safety? • Does it look like anti-social behaviour takes place on the site (e.g. graffiti, dumping, damage)? • Are there lots of people using the site or is it quite empty? • Is the entrance clear and open?
8. Dog fouling	<ul style="list-style-type: none"> • Is it clear how dog owners should deal with their dog mess? Are there bins? • Is there lots of dog fouling or scatter dog waste?
9. Appropriate provision of facilities	<ul style="list-style-type: none"> • Are the facilities appropriate for the demographic makeup of the local area? • Are there links to other green spaces and facilities nearby? • Do the paths lead where people want them to? • Are there any toilets? • Is there any seating provision?
10. Quality of facilities	<ul style="list-style-type: none"> • Are the facilities fit for use (e.g. grass length appropriate on football pitches)? • Is there appropriate safety equipment and is it well-maintained? • Are the materials used appropriate (e.g. do the surfaces drain well)? • Has redundant equipment been removed? • Is the play equipment designed to a high standard? • Is there appropriate fencing, markings, nets, information, etc. for bowling greens, tennis/basketball courts, MUGAs or football pitches?
11. Litter and waste management	<ul style="list-style-type: none"> • Is it clear how users should deal with their waste? • Are there bins and are they well-maintained and emptied? • Is there any evidence of fly tipping? • Is there a general litter issue across the site?
12. Grounds maintenance, horticulture, habitat management	<ul style="list-style-type: none"> • Are the habitats interpreted appropriately? • Are the horticultural areas well maintained? Are there many weeds? • Are the grounds and beds litter free and managed well? • Are the habitat areas maximised? • Are there adequate mowing margins for naturalistic grass/wood areas? Is it clear which areas are parkland and which areas are naturalistic? • Are the trees managed appropriately? • Is there on-site composting?
13. Building, infrastructure and/or equipment maintenance	<ul style="list-style-type: none"> • Are there toilets, cafes, bowling equipment? • Is there fencing and signage? • Are there bins, seats and other kinds of park furniture? • Is there any noticeable damage to infrastructure (e.g. gaps in fences)? • Is the infrastructure safe? • Is there any graffiti?