DEPARTMENT OF ENVIRONMENTAL AFFAIRS AND DEVELOPMENT PLANNING : DIRECTORATE INTEGRATED ENVIRONMENTAL MANAGEMENT

COMPILATION OF PROVINCIAL URBAN EDGE GUIDELINES

FINAL DRAFT REPORT

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EXECUTIVE SUMMARY

Rapid urbanisation and urban growth in many urban areas of the Western Cape Province raises concern over the sustainability of the growth and the effect on the environment, which is one of the main resources of the Province. Urban edges are one of the land use management measures available to direct and contain growth, both temporally and spatially. The Provincial Government of the Western Cape (PG:WC) initiated a study to determine urban edge guidelines for the establishment and management of urban edges in compliance with the policies determined in the Western Cape Provincial Spatial Development Framework. The aim of the study is to propose guidelines to implement the growth management policies to reduce the use of land that has environmental value and the outward growth of urban areas consistently throughout the Province.

An urban edge is a demarcated line to manage, direct and control the outer limits of development around an urban area. The intention of an urban edge is to establish limits beyond which urban development should not occur.

The use of urban edges to contain growth and to protect the environment, leads to negative consequences, such as the manipulation of the property market, however, the benefits derived from improved land use management, such as the preservation of agricultural and environmental resources, balance out the negative consequences. By establishing urban edges, undesirable growth that offers false economies of scale, becomes manageable. Growth can be focussed according to the environmental and social priorities of all spheres of government. The market often ignores these priorities and development proposals are accepted by local decision-makers, as the statutory support mechanisms to focus the growth do not exist. The criteria that should be used to delineate urban edges, and the policies according to which the edges should be managed, were determined through literature reviews, field research, surveys and discussions with major role-players in urban areas.

Environmental and urban characteristics in the various regions of the province and environmental features around urban areas vary, therefore it would not be possible to determine universally applicable conditions for the determination of urban edges. Urban edges should rather be determined within the context of the urban characteristics and by assessing the environment where they are to be introduced. The delineation and management of the urban edges should be a local function and the PG:WC must provide the legal framework within which this function can be performed. The field research however indicated that market pressure in many regions caused local authorities to approve land use applications that are in conflict with national and provincial planning policy and detrimentally affect the environment. To reduce the market pressure on local authorities, it is recommended that specific criteria be used in the determination and delineation of urban edges, and that policy be set by the PG:WC and introduced by the local authorities for the management of the urban edges and the reduction of urban sprawl. Any amendment of the urban edge would then have to be considered in keeping with the guidelines and policy. If the amendment complies with all the policies and criteria, the decision relating to the amendment could be delegated to the local authority. Urban edges are matters of regional significance and would therefore remain with the PG:WC for decisions.

The urban edge guidelines must also contribute to the creation of opportunities for the establishment of small farmers; the informal sector through community-based projects; the redevelopment of under-utilised land and centrally located low density residential areas; the development of vacant land; the redevelopment of vacant and under-utilised land cleared in terms of the old group areas rather than the outward development (away from the centre of the urban area) of subsidised housing; the establishment and conservation of biodiversity corridors; and the conservation of the aesthetic and sensitive environmental features that are the attraction in many areas.

1. URBAN EDGE GUIDELINE STUDY PROCESS AND APPROACH

1.1 Introduction

The Western Cape is experiencing urbanisation and urban growth with perceived negative consequences to the environment. The rural character of many small towns is being affected, valuable and productive agricultural land is being transformed and production lost, large low income settlements are being placed on the urban edges, placing unattainable demands on service providers and gated communities are developing in the rural areas, where leapfrogging causes further pressure on the environment. It is doubtful whether these trends in the Western Cape urban development are sustainable, as the cost of job losses in the agricultural sector, the cost of replacing agricultural resources, services infrastructure costs, the cost of traffic and public transport solutions and the cost of the loss of biodiversity and conservation resources cannot be recouped from the undesirable development.

The Provincial Government is constitutionally bound to develop policies that will enable sustainable development while promoting economic and social development. In this regard the Department of Environmental Affairs and Development Planning decided to initiate the drafting of Urban Edge Guidelines for the Western Cape Province, in order to establish and implement a consistent approach to deal with urban growth, infill and consolidation along the urban edge of all urban areas in the Western Cape.

Sustainable development is dependent on the local conditions where the development takes place, as the affected environmental characteristics would differ in each case. Likewise, the establishment of urban edges would be dependent on the local conditions. The different urban areas in the province need to be assessed differently for the implications of urban edge guidelines (for sustainable development and ultimately for achieving settlement sustainability). Understanding the different environmental elements affected by urban growth therefore becomes crucial to the study.

1.2 Purpose Of The Urban Edge Study

The purpose of this study and the report is to establish criteria for the preparation of urban edges, i.e. to determine what issues and factors should be considered in the drawing of urban edges and also where urban edges should be drawn around towns and cities. In addition thereto the report / study must set out the guidelines for the management of the urban edges in the province, i.e. provide policies for the consideration of land use applications inside, on or over the urban edge, or for that matter land use applications that leapfrog development and would occur in rural areas, ultimately skewing development trends.

In using the outcomes of this study, the local authorities should be able to establish and incorporate urban edges into spatial development frameworks and other planning documents to contain or guide urban growth. The policies in terms of which growth within or across the urban edges could be managed and land use applications affecting the edge considered, would be established in addition to the urban edge or growth boundaries determination, definition and mapping.

The Development Facilitation Act, 1995, Act 67 of 1995, places an obligation on all authorities to employ policies, administrative practices and laws that promote efficient and integrated land development in that, amongst others, they :

- promote the integration of the social, economic, institutional and physical aspects of land development ;
- promote the availability of residential and employment opportunities in close proximity to or integrated with each other ;
- optimise the use of existing resources including such resources relating to agriculture, land, minerals, bulk infrastructure, roads, transportation and social facilities ;
- discourage the phenomenon of "urban sprawl" in urban areas and contribute to the development of more compact towns and cities ;
- contribute to the correction of the historically distorted spatial patterns of settlement and to the optimum use of existing infrastructure in excess of current needs ; and
- encourage environmentally sustainable land development practices and processes.

The Constitution of the Republic of South Africa Act, 1996, Act 108 of 1996, places obligations on local authorities. Chapter 7, which deals with local government, defines amongst others the framework for the operation of local authorities. In terms thereof, local authorities are required to govern the local affairs of communities in accordance with the Constitution and other national and provincial legislation. It determines that they should :

- provide accountable government ;
- ensure the provision of services to communities in a sustainable manner ;
- promote social and economic development ; and
- promote a safe and healthy environment.

The National Environmental Management Act, 1998, Act 107 of 1998 and the Local Government : Municipal Systems Act, 2000, Act 32 of 2000, furthers the legal obligations of local authorities to ensure environmentally sustainable development practices and processes. A duty is placed on municipal officials to prevent pollution and ecological degradation, to promote conservation and secure ecologically sustainable development and use of natural resources in the best interests of the local community.

This study and the guidelines that flow from it must assist the provincial and local authorities and officials to perform their duties and exercise their obligations consistently and responsibly. The policy in terms of which the guidelines are made is contained in the Provincial Spatial Development Framework of the PG:WC. The PSDF will, in general, make broad policy statements and it will be expected of the District and Municipal Spatial Development Frameworks to be revised to give effect the broad PSDF proposals. The aim of the study is therefore to determine guidelines regarding urban edges that could be used consistently throughout the Province in order to :

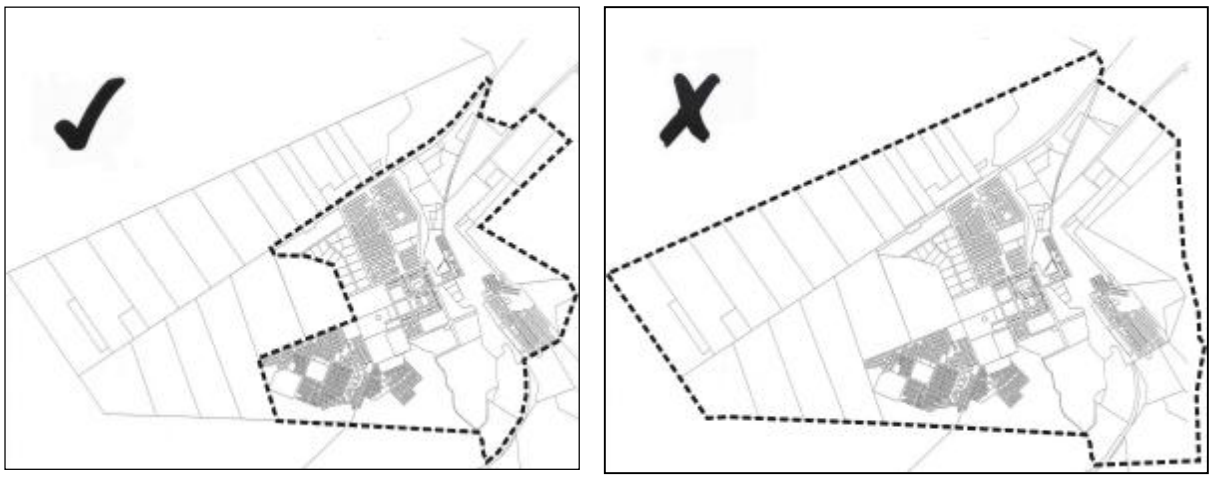
- implement the policies contained in the PSDF ;
- reduce the use of land that has environmental value for urban development, i.e. land that could be used sustainably and beneficially for agricultural purposes, the conservation of biological diversity or heritage resources, the protection of natural resources or the aesthetic quality of the environment ; and
- effectively contain the unsustainable outward growth of urban areas.

1.3 Urban Edge Definition

An urban edge in the context of this report is a defined line drawn around an urban area as a growth boundary, i.e. the outer limit of urban areas. The urban edge marks the transition between rural and urban land use, i.e. generally between urban areas where full municipal services are provided to land uses other than agriculture and the rural, predominantly agricultural, conservation and nature areas. Urban edges are intended to include an

adequate supply of land that can be efficiently provided with urban services (roads, sewers, water lines, storm water systems and streetlights) to accommodate the expected growth of the urban area for a defined period. By providing land for urban uses within the urban edge (growth boundary), the rural area can be protected from urban sprawl.

Figure 1. Typical example of an urban edge according to the definition



The definition of the urban edge, contained in the Guideline For The Management Of Development On Mountains, Hills And Ridges Of The Western Cape (Directorate : Environmental Management, 2001), is as follows : "It is a demarcated line to manage, direct and control the outer limits of development. The intention of the urban edge is to establish limits beyond which urban development should not be permitted."

1.4 The Urban Edge Guideline Project Process

The process for the establishment of guidelines for the establishment and management of urban edges had three elements or aspects, namely :

- the assessment of the impact of urban growth in the Western Cape on the physical, biophysical and socio-economic environment, as a desktop study and through empirical evidence gained from role-players in local government (it must lead to an understanding of the elements of the environment that need to be protected) ;
- the analysis of the assessment and the grounds for urban expansion (which leads to an understanding of what factors in the existing urban area require consideration in establishing policies to curb sprawl) ; and
- the making and discussion of proposals and guidelines on how best to reduce and mitigate the urban growth impacts by establishing and managing urban edges or growth boundaries.

The guidelines must be widely accepted and supported by the local authorities and by other interest groups, who would have to abide by them, e.g. property owners, agricultural communities and services agencies, thus a large percentage of the time of the project would have to be spent on consultation. This report was periodically circulated to major role-players in the municipalities as a discussion document to facilitate consultation, as it set out the basis for the study and the suggested criteria and management concepts that were investigated.

The City of Cape Town prepared a comprehensive urban edge report and established urban edges. The Cape Town urban edge study was therefore used as the basis for the research and guideline preparation, together with other suitable international sources. Initial research in literature was done to facilitate the more detailed field research.

The initial research into the establishment of guidelines for urban edges seeked answers to the following questions :

- What are the critical urban-agricultural edge issues that can be addressed by agricultural buffers, establishment of biodiversity conservation areas and other techniques ;
- What urban edges and buffers and other relevant policies are in place in the Western Cape and what are their specific provisions ;
- What are the reasons for outward growth rather than urban renewal and redevelopment of inefficient low density areas ;
- To what extent have these policies and standards been implemented and what have been the obstacles and facilitative factors ;
- What elements in the environment offer the most defensible buffers and growth boundaries ; and
- What do experts in urban planning, agricultural production and residential development suggest as optimal edge management policies and standards?

In order to get locally relevant answers, a field research methodology, including semi-structured (non-survey research) interviews and interactive workshops, drove most of the data collection activities of the project. Enviro Dinamik studied edge conditions, policies and implementation activities in all the major urban areas, forming the research sample for the project. The major role-players in these areas were consulted interactively, i.e. not in groups and repeatedly. The role-players included the local authorities, ratepayers' associations, organised agriculture, state departments involved in land use planning and other interest groups.

Profiles (including maps and photographic records) of characteristic urban edge situations in the sample areas were produced for the survey areas, identifying perceived problems from both rural and urban perspectives. The next step was to analyse the factors affecting the implementation and impact of urban edge management policies in the sample areas, then to prepare a report summarising the research findings and the edge profiles. The generally agreed criteria, policies and findings were assessed by doing scenario assessments in four areas, namely Vredendal, Beaufort West, Oudtshoorn and Plettenberg Bay. Originally the intention was to work in three urban areas (small, medium and large). However, during the research it became obvious that the differences in the approach to and application of urban edges lay in regions rather than the size of the settlements. Thus, the four urban areas in four different regions were used for the scenario-assessment. A more detailed assessment of the edge situation was also done for the George area, following on the assessment for Plettenberg Bay, which indicated unique challenges and opportunities.

This report is the outcome of the process and will now be used in consultation of all the identified role-players through a series of workshops in select centres.

1.5 Key Issues Emerging From Literature Research

South African urban areas are characterised by spatial separation of residential areas according to income level and race, urban sprawl, disparate levels of service provision, low suburban population densities and the concentration of the poor in relatively high-density areas on the urban peripheries. These factors make urban areas inequitable, inefficient, unsustainable and expensive to manage and maintain and exacerbates poverty and unemployment (Department of Housing, 1997). The introduction of urban edge management policies and guidelines could reduce some of the impacts of these "urban characteristics".

The rural towns of South Africa are suggested as "transit locations" for migrants moving from the rural hinterland to the larger urban centres (Geyer, 2002), thus the growth and decline of rural town populations could be cyclical or irregular. This view is shared by others, who believe that migration to large metropolitan areas is predominantly "a step-wise" process "along the urban hierarchy", although it is also agreed that direct migration from rural areas to large urban areas also occurs (Friedmann and Wulff, 1976).

There would have to be different guidelines and policies relating to different towns and cities, i.e. not all urban areas could introduce urban edges and manage them similarly, as the urbanisation dynamics in each urban area vary significantly. The approach to the study is thus to research the edge criteria and containment and management policies in the different urban areas of the province, keeping in mind that even within urban context there might be differences, given the dual nature of most urban areas, where rich and poor still live in segregated areas and are mostly dealt with differently by planners and decision-makers.

The international resources contribute limited guidelines that can be successfully introduced and information that can be used in the study, as most of the reported international urban areas reflect negative population growth or reverse migration tendencies, i.e. significant migration from metropolitan and large urban areas to smaller and "rural" urban areas.

As stated above, different guidelines and policies relating to different towns and cities would be necessary, as the urbanisation dynamics in urban areas vary significantly. The growth phases and growth potential of urban areas would have to be considered in determining urban edges, as the edges should either contain growth in stable and declining growth areas, or allow for expansion in urban areas where efficient natural growth occurs. It seems as though more flexible or accommodating edges would be required where growth needs to be focussed. Close or tight urban edges would then be required to prevent unnecessary (often speculative) expansion or expansion due to continued segregated development, mostly for subsidy housing development. Last mentioned often occurs in rural urban areas, where the population growth is often as a result of migration to the urban areas from the rural hinterland or other rural areas. Urban edges thus become a planning tool, not only in urban management, but also in regional growth management, promoting growth in certain urban areas, while restricting it in others.

Stringent town planning regulation and control, e.g. regulating development densities and the location of new development, is seen as the most important contributing factor in the virtual elimination of urban sprawl in Britain (Geyer, 2002). The population growth in Britain has been significantly lower than the case in South Africa, making the demand for urban expansion somewhat more manageable, however, the principle remains applicable. Another factor that played a role in the British reversal of urban sprawl was the redevelopment of central neighbourhoods and the transformation of these areas from "white working class areas ... to predominantly ethnic-minority areas" (p92, Geyer, 2002). The more affluent the

"working classes" become, the more they can afford to migrate outwards, towards the urban edge. Urban growth has historically also been strongly related to transport technology, i.e. growth occurs along access corridors (Richard, Luce and Lam, 1997), which supports the view the economic outlook of people lead to a demand for low density housing at the urban edge and ultimately sprawl. Thus, urban growth is due to not only the in-migration of people from rural areas, but also the result of internal-migration. There is considerable international evidence that suggests that migration within urban areas is the result of improved economic outlook for economically active people, who can afford to travel to work and other opportunities and for those described as "upper class mimickers" (p44, Friedmann and Wulff, 1976). Peter Self (Self, 1982) states that city growth in Europe has been consistently lower than in the United States due to the European focus on public transport and the goals of urban planning, namely :

- Efficiency (re-use of obsolete assets) ;
- Environmental improvement (protection of natural, cultural, historic and recreational resources) ;
- Equality (in dealing with all neighbourhoods and sectors) ; and
- Community (establishment of mixed societies with an equitable distribution of facilities and opportunities).

The Dutch response to undesirable urban growth is "the bundling of activities such as living, working and services … Therefore the emphasis was put on compact urbanization and a restrictive policy for open spaces." (Geyer, 2002). The Dutch case is an example of growth management. It presupposes understanding and agreement on two factors, namely :

- A clear understanding of the goals of growth management ; and
- An understanding of the dynamic forces that underlie the processes of urban growth.

Thus, the goals that need to be achieved through the establishment of urban edges and edge management policies must be defined for each urban area and in some instances for each case and agreed to by the local authority. In addition thereto, there must be a thorough analysis of the growth pressures that lead to urban development beyond the edge, as the management policies would have to be specifically aimed at countering these pressures.

The research has also highlighted other factors and issues that require specific consideration in the establishment of urban edges, such as :

- The identification and maintenance of all high potential agricultural land for agricultural production ;
- Protected ecosystems, being ecosystems that are of high conservation value or of high national or provincial importance, although they are not listed in terms of the National Environmental Management : Biodiversity Act, 2003, must be identified and conserved ; and
- All wetlands and water resources should be delineated and protected from impact by urban growth.

1.6 City Of Cape Town Guidelines

"Towards the end of 1997, the Cape Metropolitan Council (CMC) appointed three consultants to prepare edge studies for distinct sections of the metropolitan area: Peninsula, Northern and Helderberg. The Urban Edge was drafted based on a contextual analysis of the area and the synthesis of the following edge informants :

- Geophysical environment ;
- Biophysical and ecological environment ;
- River and wetlands systems ;
- Infrastructure location and capacity ;
- Land use and related patterns ;
- Demographic and population profiles and trends ;
- Legal, planning and land ownership situation ;
- Socio-cultural and historic environment ; and
- Visual resource analysis." (City of Cape Town, 2004)

The City of Cape Town realised that the establishment of an urban edge and the introduction of an all-inclusive metropolitan-wide set of policies and criteria causes all kinds of problems, similar to the problems predicted for different urban areas above. "The metropolitan-wide policy documents often use all-encompassing principles, summed up in catch-phrase jargon (e.g. densification), which can be twisted and used to substantiate any manner of development application – whether suitable or not. It then becomes extremely difficult to assess what constitutes "good" versus "bad" development since the broad principles have been shown to support the proposed development application. Although the overarching principles apply at a metropolitan scale, these need to be contextually interpreted and applied to the specific local situation."

"As a result of the inherent ambiguity in interpretation of the metropolitan-wide principles, the amendment of the Urban Edge is often used in support of the specific development application. However, as indicated above, it is critically important that each application is evaluated on its own merits and in terms of the specific local context. Within the framework provided by the policy documents, the assessment in terms of the local context should be first and foremost. The amendment or refinement of the Urban Edge, if at all, should be incidental to and as a consequence of the assessment of the specific development application." (City of Cape Town, 2004)

2. URBAN GROWTH AND MANAGEMENT ISSUES

2.1 General Causes Of Urban Expansion Outside Of The Existing Urban Edges

Considering the knowledge gained from the literature study, there must be a clear understanding of what the causes of expansion in the urban areas are, in order to address the real issues through effective and yet sustainable management. There are few outcomes that must flow from this study, however, one of the most important outcomes of the study should be to define the goals that growth management through the establishment of urban edges should achieve, in response to the causes of undesirable growth.

The general consensus is that the cause of urban growth and expansion, other than the natural population growth, is socio-economic conditions. On the one hand there is the migration of predominantly lower income people from the rural to the urban areas and the related greenfields development of low income residential areas with subsidised housing. With the exclusion of one or two towns, where infill development occurs to utilise the available land within the urban areas, all subsidy housing developments occur on the outskirts of the towns, outside the existing edge of development. On the other hand, there is significant speculative investment in property development in the "rural" coastal areas of the Southern Cape / Garden Route, the West Coast and the Overberg. Such development and growth predominantly satisfies the demand for temporary seasonal accommodation to the migration of high income people to the coastal urban areas and various small inland towns such as Greyton, Macgregor, Prince Albert, Riebeeck Kasteel, Napier, Montagu and others, that draw more permanent residents and offer "weekend" getaways. This growth phenomenon is the topic of a research project of the PG:WC, namely the Growth Potential of Towns in the Western Cape. The study will indicate where and how growth in the rural areas occurs and could be managed, thus contributing to the larger urban growth management process.

The decentralised development of industry and more often shopping centres on the outskirts of urban areas was raised as another growth factor. These non-residential uses tend to draw higher order uses to the "edge" and result in a change in the housing sector development, which often responds with higher density development in the vicinity of the higher order uses, additional institutional development, the provision of community facilities and eventually full urban sprawl. In addition to the attraction of the higher order land use, the "higher order services" generate an attraction, especially for the more mobile sector of the economy, as the capacity and relative low intensity use of the roads and the services infrastructure attract further development.

Issues relating to the financial needs of local authorities, the "development economy" and the "space culture" were other factors that were seen as causes of urban growth. These issues are related to the "high income / low income" development issue discussed above, however its approach is different. It includes another perspective, namely the concepts of unlimited space and a need for income. There seems to be a perception amongst some of the stakeholders that were interviewed, that there is sufficient space in South Africa for all the elements of life. The theory is that development will occur somewhere and that there is more than enough space in the country to cater for the rural uses lost as a result of the urban development. The income derived from the high income market development through rates and taxes must pay for the cost of free services and relatively high services infrastructure maintenance cost in the subsidy and low income residential areas. Thus, the local authorities promote high income market sector growth, regardless of the environmental and indirect cost thereof, as the income derived from the high value properties, while the services infrastructure is still new and does not require high maintenance, pays for the expenses incurred elsewhere.

2.2 The Nature Of The Urban Edge

The nature of urban edges differ, depending on the criteria and informants according to which they were established and the function thereof. There are two major categories of edges, namely hard and soft edges.

Figure 2. Typical example of a hard edge

A hard edge is drawn on the development line of an urban area, e.g. along the outside of a residential neighbourhood, industrial area or any other collection of serviced erven with a relatively high intensity of use or high to medium density of use. It might be along the erf boundaries or it might be along a road that services the outer erven. A hard edge creates an immediate transition from urban to rural use, with a large undeveloped landscape between urban areas. Hard edges are typically employed where an absolute restraint on development is essential, such as abutting conservation areas, steep slopes and high intensity agricultural uses.

A soft edge on the other hand allows for a gradual transition from the high intensity urban uses to the low intensity, often low density residential uses, e.g. small holdings, or institutional, recreational and services uses, e.g. schools, correctional services facilities, golf courses, sports fields, waste water treatment works, reservoirs or aerodromes. Soft edges have the potential to promote sprawl and the negative growth trends that need to be discouraged. Often where urban areas are in close proximity, the low intensity urban uses (edge areas or buffers) often abut the edge or buffer area of the next urban area. Various land uses, such as filling stations, tourist facilities, agricultural industries, non-agricultural uses on smallholdings and unproductive agricultural units, resorts, institutional and transport uses create the impression that the one urban area simply flows into the next. In the longer term the buffer areas along lines of transport become more intensively developed and eventually integrated into the urban area. Soft edges are on the other hand often used in a different context, to protect visually sensitive areas, nature areas and other environmental features, around services infrastructure such as landfills and wastewater treatment works and hydrological features. The urban uses inside the edge should relate to the uses outside, so as to avoid conflict between the two. The use inside could either be similar to the use outside, such as low density residential development (existing smallholdings) on the inside, with agricultural uses on the outside, or it could link with biodiversity networks, open spaces or river corridors.

In theory, there are certain urban uses that are compatible with agricultural and rural uses that abut the development. High density, low income residential areas that abut fire prone rural areas are typical examples of incompatible uses. Similarly, high rise, high density development along an edge where the visual quality of the environment needs protection, creates a conflict in use.

Figure 2. Typical example of a soft edge, open space link on the inside in the top picture and smallholdings on the outside in the bottom photo

3. URBAN EDGE ISSUES

3.1 Urban Edge Determinants, Criteria And Land Use Policies

The experience of the City of Cape Town indicated that all edge related applications had to be dealt with on the merits of each case and in local context. This is also the outcome of this study, namely that local context, more than any other factor, would determine where and how urban edges are established and managed.

The opinions of the role-players, in the various local authorities and areas, on the proposed criteria or factors for the consideration of the establishment of urban edges, i.e. the definition thereof and the delineation in the landscape, vary significantly. It is not possible to establish one single set of criteria in a rank order for the entire Western Cape Province, as the issues that are significant or important in and around one urban area are of no value whatsoever in another. A good example of this is the exclusion of valuable soils and high intensity or high potential agricultural land. In and around the Boland towns this becomes a major issue whereas at the Karoo towns it is hardly an issue. Similarly, topographical features are important in the mountainous areas of the Province, whereas it is of little or no importance in flat, featureless areas. In some areas there is no alternative but to use the mountainous terrain for expansion, unless all growth is rejected and the towns effectively "closed for new development". In some instances the urban areas are well endowed with water resources and hydrological features are important when considering urban edge delineation, more from an environmental perspective than to protect a potable water resource, whereas in other instances the towns or urban areas are no where in the vicinity of such hydrological resources. Some towns are developed around hydrological features, e.g. the agricultural use inside some towns such as Napier, Swellendam, Oudtshoorn, Genadendal, Wupperthal and Greyton and other similar towns where typically the urban agricultural or low density residential use of the rivers are both a historic and character giving element of the town.

In view thereof that the criteria and issues to be considered are so divergent, a typical "checklist approach" would have to be used in determining which of the factors and issues are of relevance to a specific urban area. The size of the town does not seem to be the most important factor when the physical features are concerned, but rather the location, i.e. the region where the town is located. There are also differences in the approach to urban edges for the different sizes and types of urban areas, as the smaller, more simple urban areas are less "exposed" to the environment than the larger areas and most importantly the metropolitan area, where a complex environment exists, for no other reason than the size of the area (1 400 ha for Vredendal to 100 000 ha for Cape Town).

There is a definite growth trend in the urban areas of the Southern Cape or Garden Route. In some instances, the growth in the number of residential dwelling units in the urban areas exceeds 20 %. The largest percentage of which is the result of middle and higher income residential development, whereas the growth in the low income or subsidy housing sector of many of the same towns amounts to between 5 and 10%. What is significant is that the urban growth far exceeds the natural population growth and the economic growth of these towns and areas. The number and value of building plans has for example grown by 100 % year on year during the last two years in one of these towns, whereas the expansion of the town into the rural hinterland amounted to less than 15% growth. It is therefore obvious that the establishment of urban edges is an essential element in the planning of the Southern Cape urban areas in order to prevent continuous growth, mostly in linear format along the Garden Route and the sea.

The following table highlights the responses gained from the planners at the various municipalities.

Table 1. Opinion survey of municipal planners and land use managers

URBAN EDGE ISSUE	**YES**				**NO**	
	High priority		Low priority			
Does the municipality have an urban edge management policy in place for all urban areas in its area of jurisdiction?	12,00	44%			15,00	56%
Are there currently any land use applications / planning proposals for development outside the edges of the urban areas – if so, then give brief description:	18,00	68%			9,00	32%
Must new or additional bulk, link or connector services infrastructure be established for the above development?	18,00	68%			9,00	32%
Do the planning and services frameworks for the urban areas make provision for the above development?	10,00	36%			17,00	64%
Are there policies in place to integrate the different market sector (high/middle/low) residential areas in the urban areas?	13,00	48%			14,00	52%
Which of the following factors inform or should inform the urban edge around the urban areas:						
Prominent landform and character areas	16,00	60%	4,00	16%	7,00	24%
Valuable soils	17,00	64%	4,00	16%	6,00	20%
Hydrology (surface and ground water features)	10,50	38%	14,00	52%	2,50	10%
Ecological resources (aquatic and terrestrial)	17,50	66%	5,50	18%	4,00	16%
Protected areas (conservation sites)	18,00	68%	7,00	24%	2,00	8%
High intensity / potential agricultural resources	19,00	72%	2,00	8%	6,00	20%
Services infrastructure (barrier effect)	7,00	24%	5,00	20%	15,00	56%
Services infrastructure (capacity and reach)	14,00	52%	4,00	16%	9,00	32%
Vacant / under-utilised land in urban area	15,50	58%	4,00	16%	7,50	26%
Higher order roads, access routes and transport infrastructure	13,00	48%	4,00	16%	11,00	40%
Cadastral boundaries of adjoining land units	10,00	36%	3,00	12%	14,00	52%
Availability of developable land in urban area	19,00	72%	4,00	16%	3,00	12%
Growth requirements over 10 – 20 year period	23,00	88%	3,00	8%	1,00	4%
Land use applications for new development	9,00	32%	3,00	12%	15,00	56%
Visual impact	20,00	76%	6,00	20%	1,00	4%
Cultural / heritage resource areas	10,00	36%	4,00	16%	13,00	48%
Ownership of land and existing land use rights	11,00	40%	2,00	8%	14,00	52%
Informal settlements	2,00	8%	0,00	0%	0,00	0%
Urban agriculture and small scale farming	2,00	8%	0,00	0%	0,00	0%
Bio-regional spatial planning categories (core and buffer)	1,00	4%	0,00	0%	0,00	0%
Density policy for residential development in rural towns	1,00	4%	0,00	0%	0,00	0%

On the other hand, growth in some of the Boland towns is well below the population growth for the middle and higher income sectors, whereas the low-income or subsidy housing growth exceeds the population growth trends and in some instances the subsidy housing development proposed for the town amounts to growth in excess of 50 %.

The question asked by all the role-players interviewed in the survey research process was what grounds would be used to draw an urban edge that would effectively limit growth and prevent any new development from occurring.

Market forces, whether population growth or speculative development, seem to dictate planning, rather than the opposite.

3.2 Growth Focus And Vision Of Municipalities

Some of the rural and coastal municipalities seem to be focussed on growth rather than efficient urban development or the conservation of scarce resources. Whereas the Cape Metropolitan Area and certain of the Boland towns have not yet reached their urban structure plan limits, i.e. the old Guide Plan limits set in the mid-1980 and early 1990's, most of the towns in the Southern Cape and Garden Route have already exceeded those boundaries. Few, if any have policies in place to contain urban growth and the indications are that some of these municipalities are of the opinion that market forces dictate the growth rather than land use management policies. The increase in residential densities, change in view of development focus from horizontal to vertical and redevelopment of inefficiently developed areas, are in one or two exceptional cases part of the planning frameworks. The remainder of the planning frameworks or planning approaches indicate horizontal growth and sprawl following on the requests, demands and approach of developers, landowners and consultants.

The questions relating to growth and the limitation thereof remain unanswered. The two main questions are : When has an urban area or a town reached its limits? Can applications for urban growth and development be refused, and if so, on what grounds?

3.3 Urban And Rural Use Definitions

In order to determine an urban edge, clear definitions should be given of what constitutes urban development and what not. The differences in opinion as to where the urban edges should be drawn indicated a clear distinction between authorities wanting to include conservation and other areas requiring protection, within the urban areas and those that opt for the contrary view. Some authorities want to include the conservation areas in order to better control access thereto and the use thereof. The others prefer to exclude such areas from the urban area by delineation of an urban edge around it, as the rural context thereof is of as much significance as the need to manage its use. The view in first-mentioned case is that the urban edge should be drawn around the outside of the urban area, regardless of whether conservation areas, nature reserves or any other occurs inside. Zoning schemes, spatial development frameworks, structure plans and the like should be used for the control of land use within the urban edge and more specifically relating to the management and use of areas designated for non-development use, such as nature reserves, urban agricultural areas, biodiversity corridors and open space networks (green belts), river corridors and large recreation facilities such as caravan parks and campsites.

In order to understand what constitutes an urban area, it must be defined. For purposes of this study and for the guidelines, urban development includes all development of land where the primary use of the land is for the erection of structures. This includes all erven zoned and used for residential, business, commercial, industrial, institutional and services uses, i.e. zonings where the primary use would be the construction of a building and the use of the property by building development, as opposed to the potential for use of the property with no building development, thus residential estates on farms and golf estates would be defined as urban uses, albeit that the "primary use" is "agriculture" or "private open space" and the "secondary use" is residential.

Agricultural uses, open space uses, conservation areas, transport zonings (excluding public transport interchanges, ranks and stations that consist mainly of buildings) and many similar use zonings refer to the use of the land rather than buildings erected on the land in order for the use to occur. These are described as non-urban uses and would be used in establishing

whether properties and uses are urban or non-urban in nature. The decision relating to smallholdings should be primarily based on the use of the property, i.e. for the generation of a primary income (urban agriculture or bona fide agricultural use) or whether it is merely a low density residential use where the owner of the property generates a primary income by working elsewhere and augmenting the primary income by the keeping of live stock or the planting of crops. Smallholdings used for bona fide agricultural purposes would or should typically be excluded from the urban area by delineation of an urban edge. However, as these form the principle part of towns such as Oudtshoorn, Zoar, Prince Alfred Hamlet, Citrusdal, Uniondale, Barrydale, Montagu, Genadendal, Wupperthal and many others, it would not always be possible to exclude these properties from the urban area by delineation of an urban edge around them.

The urban agricultural uses occur mainly along rivers and streams or in linear fashion along irrigation schemes through the urban areas in which they are located. Urban development occurs on either side thereof, making it near impossible to exclude them from the urban area by the delineation of an urban edge, unless the urban edge is not necessarily the outer limits of the town. The occurrence of these properties in the urban areas generally lower the density of the town, causing it to seem inefficient in urban context, however, the contrary might be true, namely that these uses cause the most efficient use of land within the small town / rural urban area, as it uses land within the 50 and 100 year flood lines of rivers and stream courses for the sustenance of a large number of residents that would otherwise have been “waste land”. Although the ideal vision of such river corridors through urban areas is as biodiversity linkages, river corridor conservation areas and other public uses in a well-maintained river environment, the facts indicate that very few if any of these river corridors are so maintained and managed.

This potentially excludes the general use of the criterion that all vacant, under-utilised and developable land in the urban areas should be considered prior to the delineation of an urban edge, as urban agricultural land is potentially developable, but as it is primarily non-urban in nature, albeit within the proposed urban edge, it should be excluded from any consideration of the calculation of the potential for the town to develop urban uses.

Golf courses, polo fields and other sporting facilities with low intensity structural development are seen as rural in nature, whereas a golf estate, i.e. a golf course with housing, is an urban use, unless it is a resort. Agricultural estates, i.e. farms with a large residential component for owners or shareholders (as opposed to bona fide labourer’s residences) or for unrelated freehold or sectional title ownership are seen as urban if the density exceeds one unit per twenty hectare. The zoning or nature of the development as a resort or as a “gated village” does not affect the designation as urban or rural, therefore any golf, polo, agricultural or any other resort is seen as urban if the development is intended to provide ownership of any residential unit. If the residential units are owned by an hospitality or other resort company and the units are let to the occupants for holiday purposes, it is a resort and could be rural or urban, depending on the location of the development.

3.4 Urban Edge Functions And Concepts

The purpose of and function that an urban edge performs must be determined, as this aspect is another point of difference between the various role-players interviewed in the process. Many of the local authorities have land use planning policies and spatial development plans according to which development is managed. However, not all use the planning tools available for the same purpose. Some local authorities prepared and implemented growth management policies and guidelines, but do not strictly adhere to them, as market and social forces put pressure on the policies and plans in unexpected and

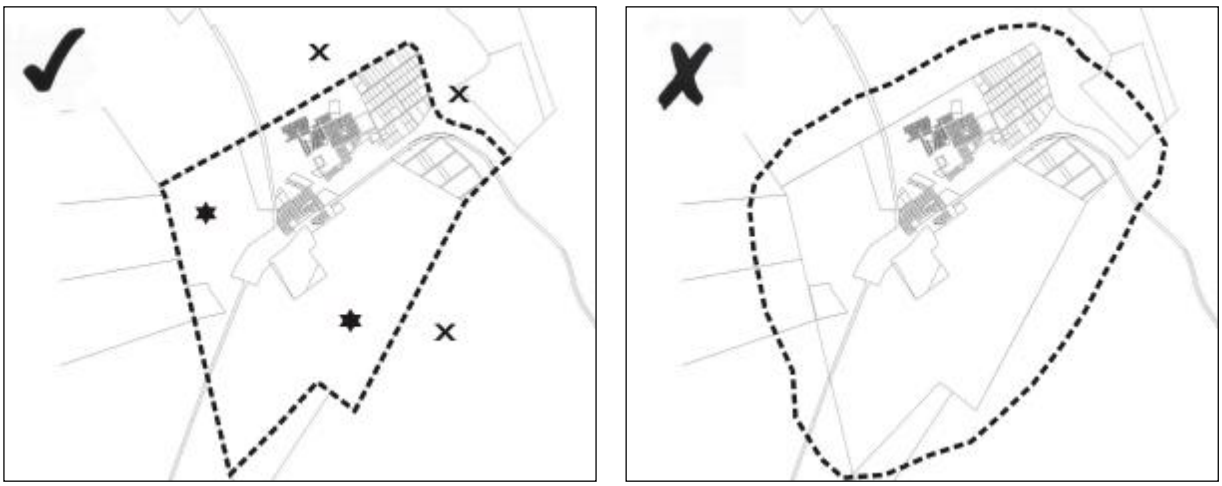
often unpredictable ways. The obstacles and facilitative factors relating to implementation of the policies and plans are as diverse as the opinions and attitudes regarding the establishment of urban edges, however, the main theme is that growth boundaries, urban edges and spatial frameworks are "guiding" rather than "determining" and that the success of all the land use planning policies and spatial development plans and frameworks depends on a unified vision of all stakeholders, namely political decision-makers, state institutions that provide services to the communities and the residents of the entire area (urban and rural).

The purpose of an urban edge is to manage, direct and phase urban growth pro-actively and to protect environmental resources outside of the urban area. It must thus assist all role-players in achieving the "triple bottom line" goals of social, economic and environmental sustainability in development.

The function of an urban edge is two-fold, namely :

- § It is a growth management tool, used to limit sprawl and the outward growth of urban areas, in favour of densification and infill development, to ensure the more efficient use of resources and land within the urban area ; and
- § It is a conservation tool, used to exclude certain elements of the environment from the urban area, in order to protect or preserve it, or to discourage its development in the short and medium term, while the long term implications are uncertain.

Figure 3. An urban edge should be drawn as a functional line to achieve specific goals – the **X** indicates high potential land or resources to be conserved, while the **Y** indicates land suitable for development with little or no resource value



As a growth management tool the urban edge could thus be a hard edge as defined above, where the services and road infrastructure could be extended to incorporate development outside of the edge. On the other hand it could be a low density, soft edge, buffer type development consisting of smallholdings where the services infrastructure would not be suitable for upgrading or extension, thus discouraging development past the edge. This type of edge has however received much attention in literature and has been proven to be ineffective and indeed a contributing factor to urban sprawl, as it encourages leapfrog development in the long term.

Undesirable land uses, such as noxious and nuisance industries, wineries, intensive feed farming, waste disposal sites and waste water treatment works, rail yards, quarries and other mining activities and brickworks are potential urban edge uses, as residential and most institutional development in the vicinity of these uses are undesirable. The edge uses would

thus create the required buffer or containment incentives, however the empirical evidence in the Western Cape alone indicates that none of these uses have been effective in the medium and long term, e.g. sawmills at Hartenbos and Thesen's Island, AE&CI at Somerset West, most of the Cape Metropolitan Area waste water treatment works and solid waste disposal sites, such as Athlone, Swartklip, Potsdam, Kraaifontein and Zandvliet, the wineries around Wellington and in Vredendal and Robertson, the Caltex Refinery at Milnerton, the old Cape Concrete Works at Bergvliet, the chicken and pig farms at Blue Downs and the Beaufort West, Knysna, Blackheath and Hartenbos rail yards and the brickyards, lime and clay quarries at Saldanha Bay, Paarl and Malmesbury. Even the Parow quarries either side of the N1 have become urban areas, after residential development encroached into the "safety zones" around them.

Ecological or biological diversity and conservation areas, proclaimed public nature reserves and heritage sites, protected natural environments and any other statutorily established sensitive environment conservation area, such as wetlands, the lakes at Knysna, Table Mountain and heritage areas, such as Pappegaaiberg in Stellenbosch, Groot Constantia and Church Street in Tulbagh seem to be more efficient as urban edges than any other land use. The significance of a legislative basis for an "absolute edge" must be one of the main issues in the concept of an urban edge, i.e. it seems as if an urban edge would only be a long term edge if there are legislated grounds for the protection of the non-urban uses outside of the edge. If not, the edge seemingly becomes just another issue in the consideration of land use and development applications, dictated by market forces.

An urban edge should not be defined as a simple continuous growth boundary, but rather a combination of purpose drawn lines with fixed points. Over its entire length it must be determined in segments to achieve specific goals, such as the conservation of environmental assets, promoting integration in the urban area, promoting growth in desirable areas, containing sprawl along major transport routes or limiting expansion beyond the reach of services infrastructure. The urban edge could thus form part of spatial development framework, as a clearly defined line on a map, representing an identifiable line in the landscape. In addition thereto, the determinants relating to each segment should be indicated in the same document, as consideration of applications relating to that edge line would have to consider all the relevant factors, which would only be possible if the factors are clearly defined and shown.

There is another view of an urban edge, namely the view of an urban edge as an area of transition, from the more intense urban to the rural use, typically as a soft edge buffer area. This concept allows for a gradual transition and has benefits as discussed above in the soft edge definition. However, the servicing, land use management and forward planning for the long term use of such a buffer often leads to gradual degradation of the buffer area, especially if it consists of smallholdings and unviable agricultural units.

3.5 Edge Determination And Management Criteria

The elements in the environment that offer the most defensible buffers and growth boundaries must be discussed and agreed to, in order to establish a generally applicable guidelines. The following issues, criteria and factors are regarded as informants when considering urban edges for the urban areas :

- Prominent landform and character areas ;
- Valuable soils ;
- Hydrology (surface and ground water features) ;
- Ecological resources (aquatic and terrestrial) ;

- Protected areas (conservation sites) ;
- High intensity / potential agricultural resources ;
- Services infrastructure (barrier effect) ;
- Services infrastructure (capacity and reach) ;
- Vacant / under-utilised land in urban area ;
- Higher order roads, access routes and transport infrastructure ;
- Cadastral boundaries of adjoining land units ;
- Availability of developable land in urban area ;
- Growth requirements over 10 – 20 year period ;
- Land use applications for new development ;
- Visual impact ;
- Cultural / heritage resource areas ;
- Ownership of land and existing land use rights ;
- Informal settlements ;
- Urban agriculture and small scale farming ;
- Bio-regional spatial planning categories (core and buffer) ; and
- Density policy for residential development in rural towns.

It is assumed for purposes of this report, that an urban edge for all urban areas, excluding the City of Cape Town, is a continuous line and growth boundary drawn along the outside of an urban area, i.e. it is not a line drawn around features excluded from development inside the larger urban area. The following explanation and evaluation of the criteria and issues must generate an in depth debate of the case for inclusion or exclusion of certain areas or elements in the environment from the urban edge. It is suggested that the criteria and informants be used for the following purposes :

- To determine where the urban edge should be located, often with serious consequences for integrated and continuous development, favouring the conservation of natural resources and establishment of open space corridors. The criteria would assist in the determination of the edge, by inclusion or exclusion of certain environmental features and in the manner in which the edge is determined in relation to the features.
- To support decisions on the distance between the existing development and the urban edge, i.e. the area allowed for urban growth outside of the current development.
- Consideration of applications for the expansion or amendment of the urban edge, subsequent to its determination, amongst others to determine a priority model for growth management.

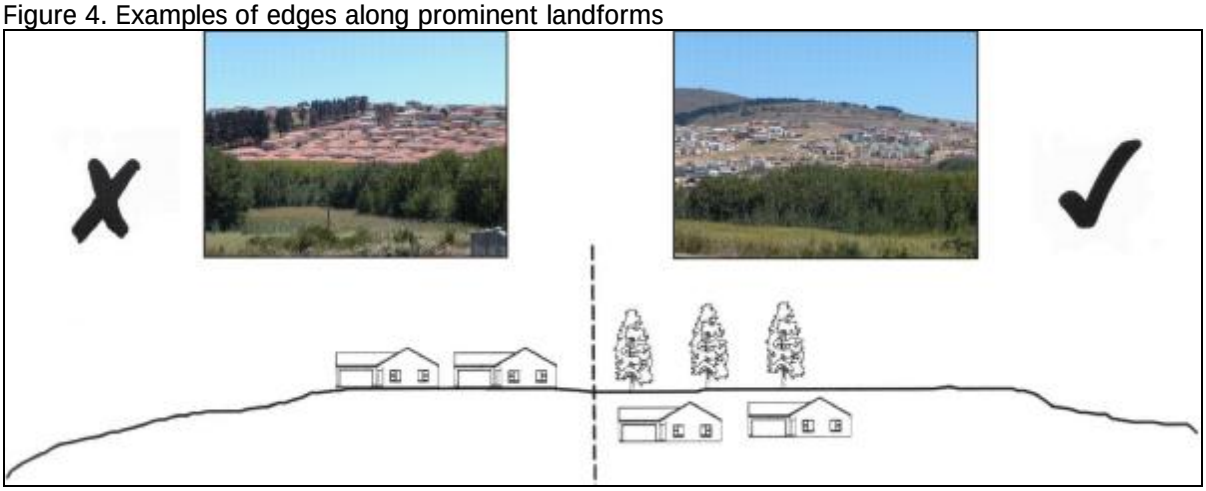
The criteria require grouping into social, economic and environmental or other suitable categories, as not all are physically determinable or visually obvious and some are management as well as determination criteria, whereas others are only determinant criteria.

Prominent landform and character areas. A mountain, hill or ridge is described as a physical landscape feature, elevated above the surrounding landscape. This includes the foot or base, slopes and crest of the mountain, hill or ridge.

A natural area is defined as an area that is characterised by undisturbed natural conditions. Such areas would typically comprise mainly indigenous species (flora and fauna). They may include areas that are infested with alien vegetation, as there is potential to rehabilitate back to predominantly indigenous vegetation. In general natural areas can be expected to be of high conservation value because of their biophysical characteristics and due to their scenic/aesthetic worth. Natural areas may also have significant value from a cultural point of view (e.g. as places that offer a wilderness experience or that have significance in terms of traditional rituals).

The gradient and slope of a prominent landform must be considered in addition to the feature value thereof. Steep slopes are often valuable opportunities for high value development. The cost of development and maintenance of the services on steep slopes however detract from the attraction thereof from an authority perspective. Moreover, development on steep slopes often detracts from the aesthetic appeal of the environment and destroys natural habitat not affected by farming activities.

Figure 4. Examples of edges along prominent landforms



Valuable soils and High intensity / potential agricultural resources. South Africa has a total surface area of approximately 122 million ha, of which almost 86% is used for agriculture and forestry. Roughly 74% of the agricultural use is natural veld and 14% (17 million hectares) arable land (Department of Agriculture, 2003). About 1,3 million hectares (ha) are under irrigation. Roughly 3% of the soil in South Africa or 3,6 million hectares can be classified as high-potential agricultural land. There is however a component of this land, which, because of the specific combination of soil, climate and crop, can be, classified as "unique" land where viable sustainable farming can exist, for example the Hex River Valley, which is world renowned for its export table grape production. The jealous protection of high-potential and unique agricultural land against any change of land use, is of utmost importance for sustainable agricultural production (Manager : Land Use And Soil Management (as delegate of the Minister Of Agriculture), 2004).

Figure 5.The exclusion of potentially valuable agricultural and other resources from the urban edge – the **X** indicates high potential land or resources to be conserved, while the **Y** indicates land suitable for development with little or no resource value

The contribution of agriculture to the gross domestic product of South Africa is 4% on average since 1994 (range of R20 mill in 1994 to R42 mill in 2002). The contribution of individual products makes for interesting research and complex consideration, as the contribution of the generally agreed high intensity crops (on high potential land), such as viticulture are lower than the contribution of low intensity agricultural crops (often considered as low potential land) such as wheat and vegetables. Soil quality, which gives rise to the "valuable soil" criterion, has often mistakenly been understood to refer to high, medium or low quality soils, depending on the value of products cultivated thereon. Soil quality and therefore the value of the soil however refers to the ability of the soil to serve its intended use. Clay soils are of high value for the construction of dams and landfills, as the clay soils are not permeable and do not allow percolation of water, whereas they are of little use for agricultural production.

The value of soil in consideration of urban edges must therefore be seen in wider context than "agricultural potential value".

There is another aspect to soil that needs consideration, namely the existence of unstable soil or soils that are not suitable for development purposes. Unstable soils are often related to the geological situation, i.e. the stability and suitability of the soil for development is not simply a surface issue, but rather a more complex geological issue.

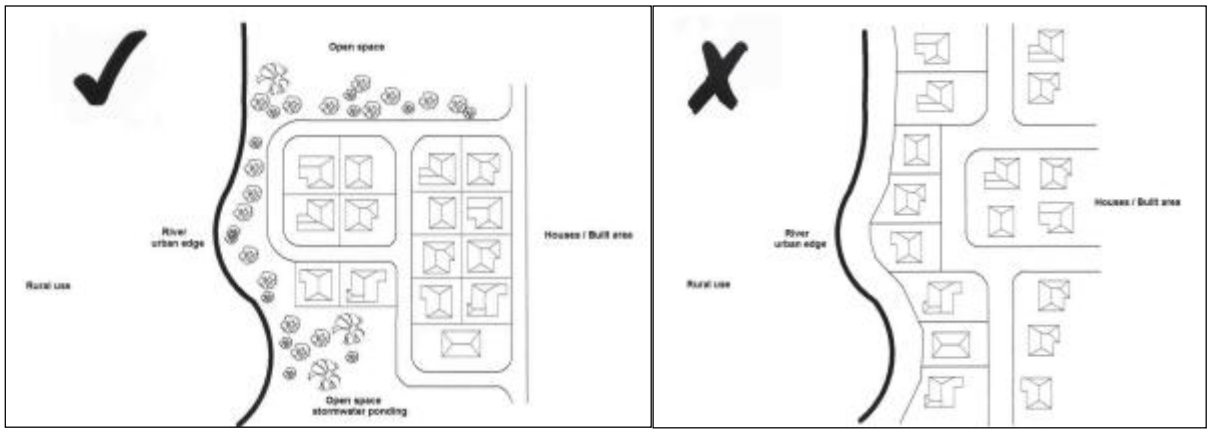
Hydrology (surface and ground water features). The riparian zones of rivers are of the utmost importance in river conservation. Riparian zones form that part of the catchment that directly affect the river ecosystem and has an effect on the quantity and quality of stream flow. The vegetation in the riparian zone supplies food to the aquatic fauna, controls the drainage of water, nutrients and other minerals to the stream, provides shade to decrease the harmful effects of warm water on the biota and stabilises the stream banks, thereby keeping the water silt-free. Many uses, such as agriculture, forestry, urban and tourism development contribute towards disturbance of water bodies and more specifically rivers and riparian zones. Modifying natural watercourses by the removal or destruction of riparian vegetation can rapidly bring about the collapse of the stream system and reduce it to an unattractive drainage system that merely serves to dispose of polluted water and topsoil into estuaries and the ocean (Department of Water Affairs and Forestry, 1999).

Wetlands are as important as river systems. However, wetlands have for long been ignored as ecological assets and sensitive environments. "A wetland is defined as land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which under normal circumstances supports or would support vegetation typically adapted to life in saturated soil" (Republic of South Africa, 1998). A wetland is therefore defined in terms of hydrology (flooded or saturated soils), plants (adapted to saturated soils) and soil (saturated). The presence of water is often an unreliable indicator of wetlands, thus the soil morphology and / or vegetation would have to be used to determine whether an area is a wetland or not. The hydrology, soils and vegetation generally change gradually from the outside to the inside of a wetland. Thus, the boundary of the wetland is often not apparent and the precautionary principle must be applied in determining the outer edges. The disruption of wetland functions has a high cost to the environment. The effects of wetland destruction are measured economically, socially and ecologically. Disturbance of wetlands can destroy critical gene pools required for medical and agricultural purposes, especially in areas where traditional medicine is practiced and where rural communities rely on the land for subsistence. It can affect the natural filtering ability of wetlands to improve water quality and it can ruin the use of wetlands for educational and recreational purposes. Wetlands also play a significant role in flood regulation and groundwater recharge. They are important as breeding and staging areas for migratory birds, as spawning and nursery grounds for fish

and as habitat for a great many invertebrates, reptiles, amphibians and plants. Wetlands play an essential role in maintaining wildlife populations, providing key habitat for a diverse fauna and flora. Wetlands are home to about one third of the wildlife species that have been identified as endangered, threatened or rare. Wetlands also support substantial tourism and recreational opportunities, such as hunting, fishing, bird watching and nature photography.

Another issue in the consideration of hydrological systems is the proximity of urban development to the coast and /or hydrological systems. Coastal erosion, rising water levels and flood lines should be taken into account in the determination of urban edges. The entire hydrological system of the earth is changing as a result of global warming. Moreover, the increase in urban areas and changes in agricultural land use cause increased run-off, which increases flood levels in surface drainage systems. These factors require larger distances between development and the hydrological systems.

Figure 6. An example of an urban edge along a hydrological feature



Ecological resources (aquatic and terrestrial). Ecosystems are not divorced from human activity. Ecological resources such as water, land, vegetation, wildlife and minerals are the basis of economic activity and often the grounds for the establishment of urban areas. Ecosystems include human beings and the interaction between humans, other forms of life and the environment in which they live. The definition of "Ecosystem" in the Manual For The Application Of Bioregional Planning In The Western Cape Province (Provincial Government of the Western Cape, 2003) is : "A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit". An "ecological community" is defined as "all the organisms that live in a given habitat and affect one another as part of the food web or through their various influences on the physical environment", which includes humans.

Biological diversity or biodiversity as it is mostly referred to, is the collection all living organisms in the environment. As all organisms have genetic differences, it is important to preserve as wide a genetic pool as possible, to ensure the continued presence of life for as long as possible. The value of biodiversity to the environment and more particularly humans can be measured in the intrinsic value through its mere existence and use value for medicinal, research and sustenance purposes. In order to achieve the highest diversity, the largest possible collection of living organisms needs protection and preservation in the environment, as an ecosystem.

It is essential to consider the proximity of development to the coast and /or hydrological resources, as mentioned above. The nature of the fauna and flora, in terms of sensitivity

and rarity, should guide the location and intensity of development in proximity of aquatic resources. Sensitive and rare collections of living organisms should not isolated by development. They should rather form part of a wider biodiversity network where natural migration is not inhibited, which suggests exclusion of such ecosystems from the urban area.

Protected areas (conservation sites). Protected areas are related to the conservation issues discussed above, as these areas are proclaimed in order to conserve cultural or ecological resources or biological diversity. Moreover, there are legal issues related to protected areas, as they are proclaimed in terms of specific legislation that would determine whether or not a specific area could be included into an urban area or not and in what context.

Inclusion of protected areas in the urban edge reduces opportunities for later expansion and the establishment of biodiversity corridors. Surrounding it with development puts pressure on the conservation area and often decreases access thereto, e.g. if erven back onto it.

Services infrastructure (barrier effect). Services infrastructure has the potential of creating barriers to development. High voltage transmission power lines often have servitude widths of 40 – 80 metres. These servitudes, combined with roads, other servitudes or ecological corridors present visible and often easily definable boundaries and therefore urban edges. On the other hand, the services servitudes also offer the opportunity of establishing biodiversity networks and green belts in urban areas, maximising the use potential of the available land for development, while using the services networks as open spaces.

Railway lines, inaccessible and higher order roads (freeways and elevated roads), waste water treatment works and solid waste disposal sites are examples of the services infrastructure that create barriers to development and are often undesirable within urban areas. While it is acknowledged that elements of transport infrastructure offer as many opportunities as it creates buffers, it is also recorded in literature that these infrastructure elements, when included into the urban areas, hasten urban expansion and promote growth.

Waste water treatment works, solid waste disposal sites and bulk reservoirs also create buffers and, when surrounded by urban development, cause nuisances, either for the surrounding residents and land owners or for the service providers. Odours, periodic upgrading of the bulk connections, noise and the use of hazardous substances should cause these uses to be excluded from the edge, to form part of a biodiversity network or at least an open space network if it has no biophysical value.

Services infrastructure (capacity and reach). Development that occurs adjacent to the urban edge should be planned and designed in such a way that future development could take place on the outside thereof, unless there are insurmountable obstacles that would prevent development, regardless of changes in technology and policy. The internal road network, link and connector services and the services distribution network, should on the one hand ensure that sprawl and incremental growth is not encouraged, but on the other, it should provide sufficient scope for feasible extension of the development.

To this end the Department of Water Affairs and Forestry created legislation to manage water and sanitation services provision. The objective of the legislation is to promote the best interests of all stakeholders in services provision. Amongst others, the stakeholders should have water and sanitation services that are efficient and financially sustainable, provides universal coverage to people that want and are willing to pay for the services and all stakeholders in a similar manner (Department of Water Affairs and Forestry, 2003). Many of the older and larger urban areas have reached the situation where it is no longer feasible

or possible to provide services to new development on the urban edge through one integrated services network, as the capacity of the networks have been exceeded and it is not physically possible to upgrade or duplicate the link and connector services. The situation is then reached where additional bulk infrastructure must be established, together with new link, connector and distribution networks.

This aspect needs careful consideration, as it is important to recognise that all development, inclusive of services infrastructure development, must be socially responsible and it should stimulate equitable and sustainable development. However, it should also be environmentally and economically sound. All costs associated with the provision of infrastructure services, direct and indirect, need detailed assessment when considering edge development or the establishment of urban edges. Existing residents should not be disturbed or affected by the provision or upgrading of services to supply edge developments.

Vacant / under-utilised land in urban area and Availability of developable land in urban area. Consideration of the extent of vacant and under-utilised land in the urban area plays a role in the determination of the amount of land to be included in the urban edge, i.e. its proximity to the existing development.

The occurrence of vacant and under-utilised land in urban areas translates to costs, therefore it does not fulfil the "triple bottom line" of social, economic and environmental sustainability**.** The costs are related to the cost of transport for residents, goods and services that have to pass by the vacant and under-utilised land daily from and to the edge. There is also an added cost to the interaction between the productive farms in the rural areas and the markets in the urban areas, as the distance between the two increases as the urban area expands. The loss of resources, such as usable agricultural land, biodiversity and other environmental assets also has a cost.

There is however also a benefit to the availability of vacant and under-utilised land, as it contributes to the reduction in the cost of land and accommodation in urban areas. Accommodation therefore remains affordable, whereas numerous resources indicate the lack thereof as a significant factor causing high land values and accommodation costs. Infill policies, such as the establishment of urban edges in proximity of the existing urban fringe, attempt to encourage the development of vacant land within urban areas. Infill development is supposed to be more efficient than edge development, as it conserves rural land and land uses, promotes the more efficient use of existing facilities and infrastructure and reduces services infrastructure maintenance costs.

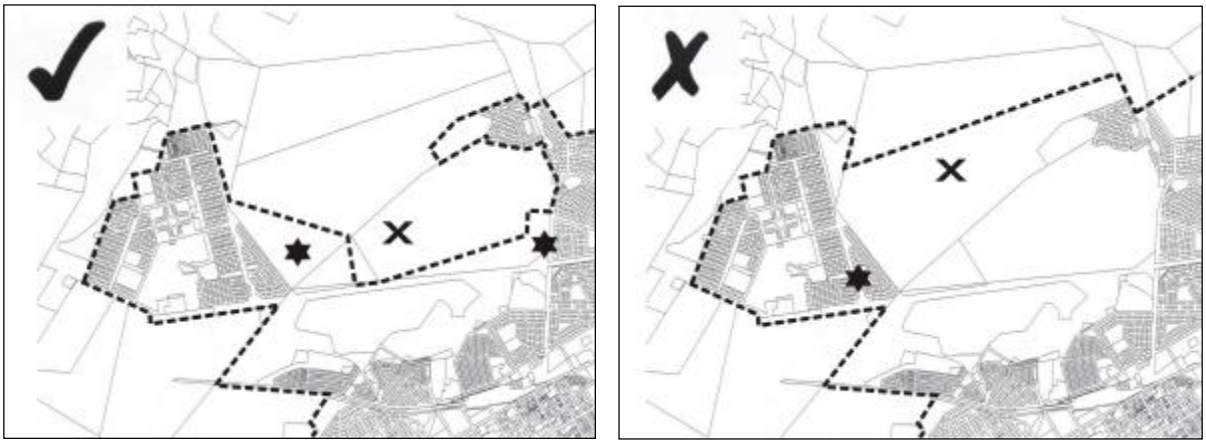
The definition of vacant and under-utilised land should be considered carefully, as there are many aspects relating thereto that could create untenable situations when uniform policies are introduced. The issue of low density urban agricultural areas, low density development in "character areas" and vacant land forming part of biodiversity networks needs consideration, as such areas are deemed vacant and under-utilised by some, while open spaces, sports fields and large school grounds are deemed vacant and under-utilised land by others.

Higher order roads, access routes and transport infrastructure. Transport infrastructure is a major contributing factor in urban growth, especially in low density, high income neighbourhoods. Inclusion of the infrastructure theoretically promotes growth, whereas exclusion leads to a duplication of the infrastructure, i.e. additional cost, as new development and growth is reliant on transport linkages. Urban uses tend to spread along roads, where the visibility attracts passing customers, especially along tourist routes, where the urban uses also detract from the aesthetic quality of the area that is the reason for it being a tourist route. The urban edge should be used to deter such undesirable uses.

Cadastral boundaries of adjoining land units. An urban edge could theoretically be drawn anywhere, as it is a line drawn for a specific purpose, namely to contain growth or sprawl or to protect an element in the environment. In some instances it could be drawn on an existing cadastral boundary, such as a nature reserve boundary, whereas in others a feature in the landscape could be used, e.g. a river, or it could also be a definable line between two points. The use of cadastral boundaries of developable land outside of the urban area could lead to the incorporation of surplus land in the urban edge, or the establishment of an edge that protrudes into the rural area and creates an inefficient development area, while exposing the adjacent land to development.

The environmental features of the land, rather than the ownership or cadastral boundaries, determine where the edge should be drawn.

Figure 7. Rounding off of urban edges along cadastral lines rather than environmental features – the **X** indicates high potential land or resources to be conserved, while the **Y** indicates land suitable for development with little or no resource value



Growth requirements (over a predetermined period). One of the methods used in determining urban edges is the calculation of the growth rate of the urban area in relation to the availability of developable land. The growth rate determination includes the calculation of land requirements for supporting infrastructure and facilities, at predetermined development densities. This aspect however addresses the distance that the edge must be drawn from the existing development only. It does not address the location thereof in the landscape, as in most of the other cases discussed above. In larger urban areas, this aspect could determine where an edge should be drawn in proximity of the existing development and where it should be further, depending on the environmental features that require protection in the rural landscape and the nature of the growth, i.e. industrial, institutional, residential or commercial, as it should be use specific. The distance between the edge and the existing development indicates where growth is being promoted and where it is being discouraged in keeping with the spatial development plans applicable to the area.

This criterion is closely related to the edge management policies that must be implemented in support of the edge, as the policies would determine how and when the edge could be adjusted, without which an uniformly distant edge might as well be drawn around an urban area. The most suitable and assessable time period is 5 years, i.e. as part of the Integrated Development Planning process of local authorities. It is also closely related to the availability of land for development discussed above. The growth requirements must be related to the PSDF policies regarding densification and must be calculated in keeping with an audit of all land and development opportunities in the urban area.

Land use applications for new development. Does the market dictate where development occurs, or does forward planning? If the market dictates, then the urban edge would be a flexible line with no real purpose. If pro-active planning is the determining factor, then an urban edge has real value in achieving the goals set out above.

Visual impact. The value of the environment is often under-estimated from a visual perspective. It is the visual quality of the environment that, to a large degree, generates the attraction for the tourism industry and draws people to certain areas as desired locations for living a lifestyle out of the large cities and densely developed urban areas. The visual resources of more rural areas or the Garden Route, such as scenic landscapes and the cultural streetscapes and farmsteads, constitute major tourist attractions. Visual qualities of the environment also forms the backdrop to most other tourist activities, such as 4 x 4 routes, hiking trails, camping and recreational activities and even sporting facilities that sustain local economic activity. The growth of golf resorts in the Garden Route serve as examples of the attraction of the environment and more particularly the visual environment for interest in sporting facilities. Added thereto, the experience of reserves and resorts in the Cederberg and the Karoo are as much in the visual quality of the environment as it is in the attraction of the facilities.

Each area has its own unique visual character and atmosphere, which plays an important role in the quality of any tourist experience. The diversity of the landscapes makes it essential to consider all development and more particularly the expansion of urban areas, an issue that requires special consideration. The intention is to manage urban development in such a way that no development would detract from the visual quality of the environment and that all development conform to a characteristic style and urban form that suites the character of the area.

This implies that edge development should not only be limited to certain areas through inclusion or exclusion, but that edge development should also be subject to urban design guidelines, architectural consideration and general aesthetic treatment. The visual quality of the environment is not limited to the natural environment. The built environment has as much of an effect on the aesthetic appeal of an area as has the natural environment.

Cultural / heritage resource areas. Cultural value means areas, sites or objects which have historical significance. This includes modifications to the natural environment, which are of historical significance as well as natural environments that reflect cultural or historical heritage. This includes areas or sites:

- that are designated as national heritage sites ;
- that are designated as national monuments ;
- that are documented as being of cultural significance by the relevant authority (e.g. South African Heritage Resources Agency) ;
- that are documented as being of cultural significance by a research institute (e.g. relevant university department, South African Museum) ;
- that have a long-standing tradition of being of cultural importance to a community or that are designated as being sacred sites by spiritual leaders in the community.

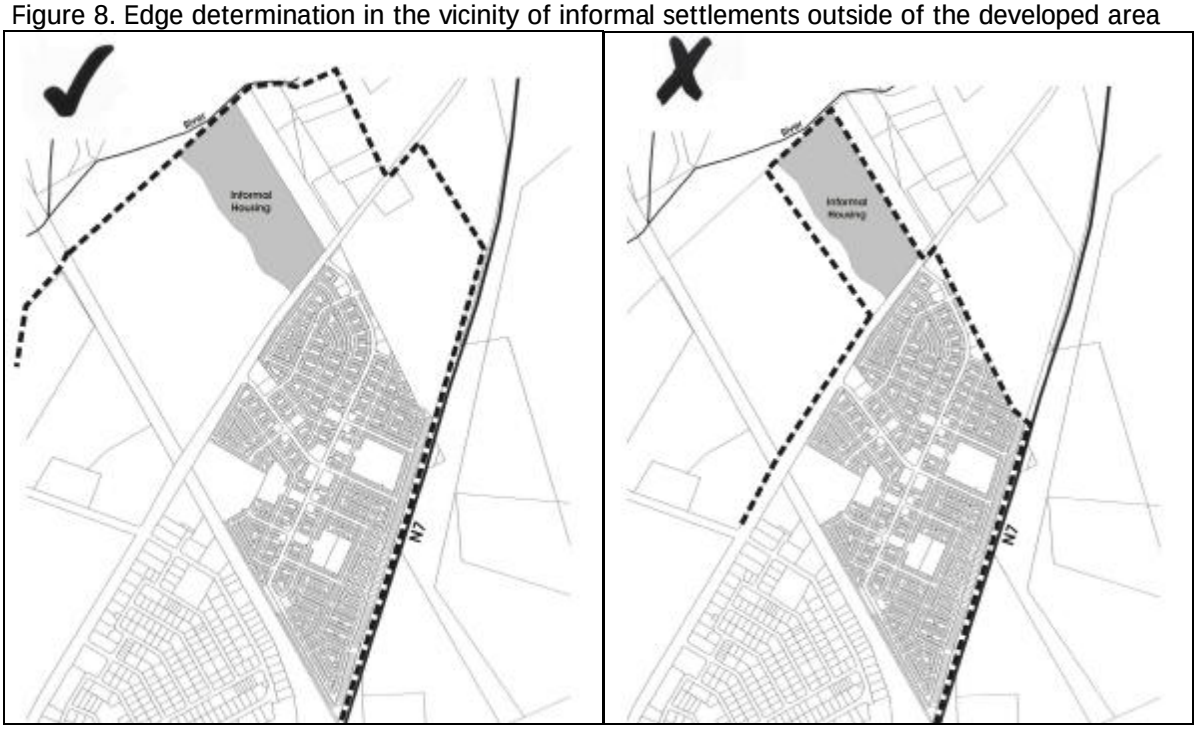
People relate to their cultural roots and to history. Therefore, protection and conservation of cultural resources contribute to the well-being and social cohesion of communities. The quality of life in many urban and rural communities is enhanced by the cultural resources that occur in the area as a reminder of the history of the community.

Ownership of land and existing land use rights. Many land owners acquired land at the urban edge solely for development purposes. Large tracts of land around urban areas are owned by local authorities and in some instances the state. Such land is often included in the urban edge by default, as it is not productively utilised for agricultural purposes and the use thereof causes its degradation. The situation of the land might however not be in line with current planning and development principles, and yet it is mostly included, as its disposal or continued use for agricultural or other non-urban purposes would not generate the best income.

There are also numerous examples of historic land use authorisations that have remained undeveloped or partially developed, outside of the urban fringe. Inclusion of this land in the urban edge would probably satisfy the owner, but would not necessarily comply with current best practice. Thus, ownership and existing land use rights need serious consideration as a criterion relative to the other criteria when determining the edge. The ownership of land should be one of the lesser criteria in determining the edge. Undeveloped land with historic rights should be treated likewise.

Informal settlements. Informal settlements and subsidy housing schemes have traditionally occurred outside of current urban areas as a result of the old segregation policies of the country.

Figure 8. Edge determination in the vicinity of informal settlements outside of the developed area



This phenomenon has now become an entrenched practice, as the land values, i.e. agricultural land values, outside the urban edge are relatively low and large areas can be acquired to enable "economies of scale" in subsidy housing development. These are however more often than not "false economies of scale", as the long term and socio-economic costs of such edge development is not calculated or it is simply ignored. Access to opportunities for the normally low income residents is made more difficult by the peripheral or edge development and the capital and operational costs of services, transport and social services are high, but not calculated in relation to alternative development options. Informal settlements are acknowledged as a major concern by most local authorities, however, few have established pro-active management policies to deal with an influx of homeless people

to the urban areas. As a result, the segregation development patterns are exacerbated as new in-migrants locate where they feel safest, namely in proximity of other residents in similar socio-economic circumstances.

Informal settlements also bring about a social aspect to the determination and management of urban edges, as informal settlements are generally perceived as having significant negative impacts on economic land uses. Thus, the perception or the affects need changing, through pro-active planning measures, such as the establishment of suitable edge use areas, the determination of restrictive edges that promote the integrated growth of urban areas or allowing edges that would contribute to development in vicinity of the informal settlements.

Urban agriculture and small scale farming and Density policy for residential development in rural towns. Some of the rural local authorities highlighted these aspects, as urban agriculture still plays a significant role in the community and this leads to extremely low development densities. Many of the small towns and urban areas like Genadendal, Middleton, Melkhoutfontein, Suurbraak, Elim, Zoar, Wupperthal, Mamre and Prince Alfred Hamlet rely strongly on the ability of the residents to produce their own food for sustenance and to produce for small markets or co-operatively for larger markets. Erf sizes typically vary from a 1 000 – 30 000m² in these towns. As a result, the development densities of these urban areas are extremely low and they are inefficient from an urban services perspective. These towns however have other strengths and benefits that can not be measured in urban servicing terms. The social value of the unique land use probably far outweighs the costs of the inefficiency from a services perspective.

A common criticism of urban sprawl in the available literature is that, amongst others, it weakens neighbourhood social ties. Lance Freeman (2001) undertook a quantitative study of how residential density and automobile dependence relate to neighbourhood social ties. The study found that neighbourhood social ties were unrelated to residential density but were significantly and substantially related to automobile dependence. Increases in auto-dependence were associated with significant decreases in the likelihood of survey respondents having neighbourhood social ties. Thus, the social value of the low density development must not be underestimated, especially as most are not the typical "automobile dependent" neighbourhoods referred to in the Freeman study and urban edges around urban areas that display historical agricultural characteristics must make special provision for the preservation of the resource.

On the other hand, there is a need to increase densities in select areas within the towns and cities. The normal planning principles and development approach determine the most suitable locations and means of achieving the goals of densification. For purposes of this study, the criterion simply needs highlighting. Growth across an urban edge or outside of an existing urban area should not be permitted unless the development density of the development is in keeping with the trend to higher densities, which, together with the principle of grading densities down from the central areas to the edges, means that there must be an increase in residential densities in selected and clearly demarcated areas.

Bio-regional spatial planning categories (core and buffer). The bio-regional planning manual provides a good background to the value of various biomes (a group of ecosystems) when considering urban edges. It also determines spatial planning categories (SPC's), two of which are core and buffer areas. Core areas indicate wilderness areas, where no development should occur. Buffers areas are in support of the core areas and are also not intended for development. As a result, the indication of bio-regional spatial planning categories would effect urban edges and cognisance should be taken of the SPC's, especially in the coastal and mountainous regions.

3.6 Additional Edge Determination And Management Issues

The additional issues that require consideration in the definition, delineation and management of an urban edge relates to the purpose thereof, namely to direct and phase urban growth. It is obvious that an urban edge would have to be expanded or amended at some time in the future, as the urban population growth continues. It is also obvious that the entire urban edge would not be extended, but only sections thereof, in response to certain inputs, such as land use applications or pro-active planning through spatial development frameworks. Thus, the edge line segments must be ranked in terms of priority for preservation of the edge. The priority is thus linked to the maintenance of the edge over the long term. A high priority edge is one that must be retained at all possible cost, whereas a low priority edge would be one that could be amended in response to a suitable application or in the course of a spatial development framework planning process. The prioritisation must be done in consultation with all the major role-players in the planning process, as it relies on the relative significance and sustainability of the rural or non-urban use on the outside of the edge. It requires amongst others comparison of the agricultural potential of farms and farming activities, comparison of the aesthetic quality of various places and environments, the biological diversity and conservation value of different sites, the visual quality and hydrological situation of the rural area surrounding the edge and the cost-benefit assessment of development scenarios and the preservation of the rural use and relative assessment of all land outside of the edge in terms of the other edge determination criteria discussed above. The priority could also relate to specific use. One segment of the edge could thus be amended to allow for industrial or residential development while it is of higher priority than another segment, depending on the compatibility of uses inside and outside of the edge and general planning principles.

Low priority edges must be supported by spatial planning proposals that indicate what development should ideally occur on the outside of the edge over time. The density and nature of the development along or up to a low priority edge must differ from the nature of the development along a high priority edge, as in the one instance development across the edge is being promoted, whereas in the other it is being discouraged.

As a growth management tool, used amongst others to limit sprawl and promote densification and infill development, the local authority must identify land for alternative development inside of the urban edge. Thus, if there is suitable land for development inside of the edge, then the edge should be retained until the available land has been utilised. This requires detailed planning and probably rezoning of land as part of the process. It is suggested that land identified for residential infill inside the urban edge be rezoned to a suitable zoning, to prevent its use for other purposes that would cause it not to develop and thus for the edge to be expanded while there is still vacant, under-utilised or developable land available inside the edge. Land that is not intended for development in keeping with its zoning and in terms of a spatial development framework should likewise be rezoned to the applicable zoning, to indicate its suitability or not for development that would otherwise cause amendment of the edge. The urban agricultural uses in the urban areas referred to above are the prime example. These should all be rezoned to a suitable agricultural zoning, which would indicate that it is not a low density residential use area and therefore not suitable for redevelopment and infill. On the other hand, the local authority should indicate commonage inside an urban area as suitable for development and zone it accordingly, unless some other environmental or heritage issue causes it not to be suitable for development.

The indication of land in this manner creates ideal opportunities for a reversal of the segregated development that occurred previously. Many of the urban areas still have undeveloped segregation buffers between the old group areas and large vacant tracts of

land where communities were relocated. The local authority should indicate such land as an opportunity for infill development to redress the previous planning practices if there are no outstanding land claims applicable to the land. The nature of the infill development should take cognisance of the surrounding development, but primarily focus on returning the land to the communities that previously occupied it and were forcibly removed.

As a tool to direct and phase urban growth, local authorities must also use the urban edge to re-establish and create opportunities for access to natural amenities, where current development trends exclude access to natural amenities. Natural amenities refer to beaches, rivers, water resources and mountains. There are examples of policies that allow local authorities to re-establish access to natural amenities when land use changes occur, e.g. by determining that all land below the 1:100 year flood line of a river revert to the local authority as open space if any change in the status of the land abutting the river occurs. Access to the public land and the amenity is included in the guidelines, to ensure that it is accessible and usable as a resource. The linear development of urban areas along the coastal areas, rivers, water bodies and mountains must be prevented by the establishment of urban edges. Moreover, the urban edges should create suitable buffers between the amenities and the urban development that does occur in proximity of any amenity, which is in keeping with the criteria for the establishment of urban edges (exclusion of rivers, prominent landforms, and others) discussed above.

The use of the edge criteria are however dependent on the purpose of that specific section of the edge. The urban edge could be used as a tool to achieve urban restructuring or conservation goals. As stated above, the purpose of the edge, namely to direct and phase urban growth, must be the primary consideration when it is determined. In many of the urban areas the old segregated neighbourhoods are literally “miles apart”. The purpose of the urban edge could be to cause urban restructuring by drawing close, high priority, edges where possible around the furthest sides of the neighbourhoods and low priority edges along the facing sides of the neighbourhoods, if any edges are required, thus promoting growth between the neighbourhoods as a priority. Likewise, the edge could be used for the establishment of conservation areas, i.e. where they do not exist, but where there are grounds for the establishment of conservation areas. Where ecologically sensitive areas exist outside of the urban edge, causing a buffer between land that is suitable for development and the urban area, a high priority edge must be drawn either side of the sensitive area, or an ecologically determined edge development with sufficiently wide and interconnected corridors leading to and along the ecologically sensitive area must be permitted. In the one instance the edge would cause the sensitive and the suitable (developable) land to be excluded from the urban area or leapfrog development. In this case the land would remain in private ownership and largely inaccessible, often with detrimental effect on the ecological value thereof. The alternative is to include all the land in the edge, but with suitable planning designations, with the purpose of conserving the ecological asset value thereof. Controlled access to land that is of conservation significance is often its saving grace. The granting of development approvals on the less sensitive portions of private land that is largely worthy of conservation, in order to raise funds for the conservation and the incorporation of the sensitive sections into a larger biodiversity network, could contribute to the conservation thereof. If it is accessible to an interested public, the conservation value thereof increases and this would only become possible by inclusion of the land in the urban edge or the acquisition thereof by a public conservation body.

The purpose of an urban edge must also be seen in regional perspective, especially in view of the recent growth potential studies undertaken for the Province. Tight, high priority edges should be drawn around those urban areas that should not be allowed to develop from a regional perspective. These urban areas are often residential in nature (seaside

residential neighbourhoods established as holiday centres, the labourer's villages established in the Southern Cape forestry areas and old mission stations) or they are service centres for intensely developed or extensive farming communities and old railway sidings and stations with little or no economic base that justifies continued growth.

Figure 9. Urban edges could be used to protect environmental amenities and prevent linear development, in this case a river edge is shown – the **X** indicates high potential land or resources to be conserved, while the **Y** indicates land suitable for development with little or no resource value

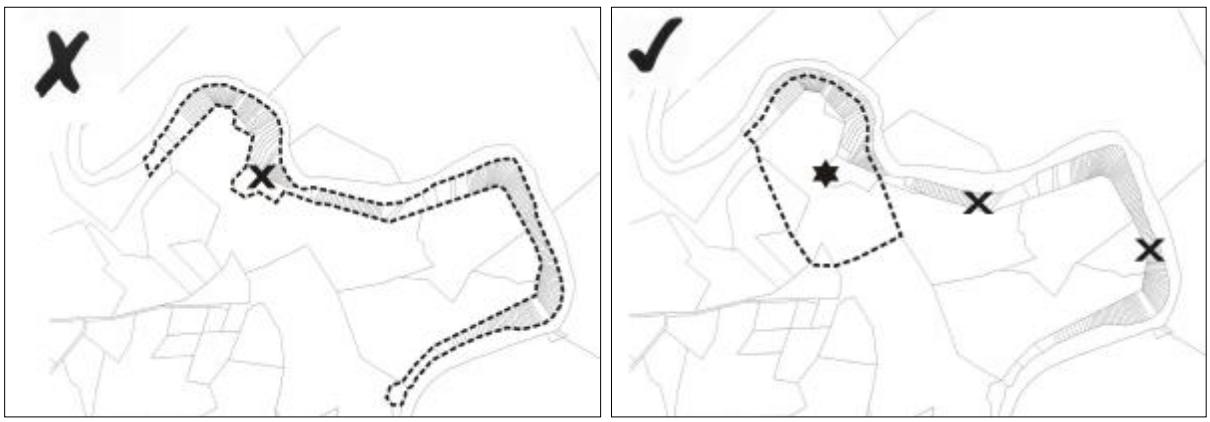


Figure 10. Use of urban edges for urban restructuring – use edges to fill in land between segregated neighbourhoods, rather than individual growth around towns – the long term result is shown below right, while a phasing scenario, growing the segregated areas, is shown below centre

4. EDGE MANAGEMENT GUIDELINES

4.1 Spatial Planning Initiatives

All local authorities are obliged to prepare spatial development frameworks and integrated development plans. Amongst others, these planning initiatives must address urban sprawl, growth management and conservation of the environment, as set out above. Thus, there is an obligation on a local authority to determine an urban edge for each urban area within its area of jurisdiction. Hitherto there have been no set guidelines for the establishment and no policy for the management of urban edges. As a result, at the time of preparation of this report, only 44% of the local authorities in the Western Cape Province had established urban edges and accepted edge management policies, many of which were arbitrary edges without any explanation of the establishment criteria and flexible management policies.

In order to establish consistently defensible and managed urban edges, the urban edge determination process should follow the guidelines set out in this report. Spatial development frameworks should incorporate specific edge determination and management sections, setting out the grounds for the determination of the edges and the purpose of each section thereof, or the edge determination should be done in a separate study. In addition thereto, the management guidelines relating to the urban edges of all the urban areas must comply with the policy contained in the Western Cape Provincial Spatial Development Framework, or other suitably legislated policies or regulations adopted by the PG:WC.

Spatial development frameworks would typically have a series of boundaries, e.g. the urban edge, which could either be inside or on the planning boundary, the planning boundary and boundaries of special areas, e.g. areas of densification, urban agricultural boundaries, edge buffer areas set aside for community related projects and small scale farming and development boundaries along biodiversity corridors.

4.2 Applications That Affect The Edge

There are various types of land use applications that affect the urban edge. Regardless of the proposed land use proposed or the type of development, the following effects are the most obvious that will receive further attention in the edge management guidelines. The effects of concern are land use applications that potentially :

- abut the edge (on the inside or the outside) ;
- cause amendment of the edge ;
- cause development outside the edge ; and
- affect an edge management area.

A specific edge consideration process must be established, as urban edges are as yet not incorporated specifically in any land use planning regulations, planning policies or statutory guidelines. Thus the consideration process relating to land use applications must be developed and made statutorily applicable, in order to standardise the process and have consistent decision-making on all edge-related applications.

Any land use application, which falls into one of the above categories, made in terms of the applicable legislation for the Western Cape must also be considered in terms of the proposed Urban Edge Guidelines. Therefore, the urban edge, the abutting edge buffer areas, inside and outside of the edge, and the areas earmarked for infill and re-development to prevent urban expansion and amendment of the urban edge, need to be defined and shown in the applicable urban edge document, such as a spatial development framework. The role-

players in an "edge" application need to be aware of the implications of the application, the issues involved in the consideration process and the process. The first step in the process is to determine in which of the categories the application belongs, i.e. is it an edge application or not. If it is, then it must be considered in keeping with the applicable process. The fact that the application affects the urban edge should be specifically included in the normal public participation processes that accompany land use applications, except that the urban edge is not "site related" and that therefore the larger community should be included in the process.

A decision-making model that is universally applicable will be suggested to guide the process.

4.3 Decision-Making Process For Applications That Affect The Edge

Applications abutting the urban edge. The detailed evaluation of the application and assessment of the proposed development would have to include two aspects, namely compliance with the applicable policy and the suitability and nature of the proposed use in the affected environment. The first factor to consider upon receipt of an application that abuts the urban edge must be the purpose of the edge in that specific location, e.g. was it drawn to protect an environmental resource, to limit growth in this position and / or promote growth elsewhere or to limit growth at the end of the existing services networks. The next factor must be the compatibility of the proposed and existing uses inside and outside of the edge. An application on the outside of the edge must be considered in terms of its nature, i.e. is it urban or rural in nature in terms of the above definition. If it is urban, then the application must be assessed as an edge amendment application. If it is rural, then its effect on the edge determination factors must be assessed and it must be considered for its compatibility with the use inside of the edge.

The policy evaluation and proposal assessment would include the determinants referring to densification, growth priorities and the availability of suitable land for similar development. It therefore includes a need aspect, i.e. is there a need for such development, and if so, then where is it best located in terms of the policy and guidelines.

The compatibility assessment includes fine detail such as the form, layout, aesthetics and design of the proposed development. It must also include assessment of the cumulative and knock-on effects, e.g. the need to establish new bulk infrastructure and the effect that this would have on the edge and in general on the "triple bottom line" and the impact of development that is likely to cause further pressure on the edge, such as shopping malls and subsidy housing. The effect of insensitive development at the urban edge on the quality of the environment could probably not be better described than by the example of the three high rise blocks of flats at the foot of Devil's Peak in Cape Town.

While applications inside of the edge are being considered, the longer term management of and policy relating to that specific portion of the edge should also be considered. The above example of the blocks of flats would not have been as harsh if the future growth of the town was directed up the slopes of Devil's Peak and the blocks were viewed against the backdrop of a densely developed urban area, rather than the mountain as an environmental and cultural feature. Thus, if the application of the precautionary principle indicates that the proposed development abutting the edge could result in significant negative impacts, then alternatives need to be considered. The alternatives obviously include adjustment or refusal of the application or, with due consideration of the cost and the responsibility for the implementation of the conditions, the conditional adjustment of the use on the outside of the edge. The land use on the outside of the edge should then promote opportunities for the

community, rather than the proponent, e.g. the establishment of small scale farming operations, community gardens or community brick-making businesses as a buffer between the urban and the rural uses, where the two would probably not be compatible. These buffer uses could be either temporary, i.e. short and medium term measures, or permanent.

As the decision on this type of application does not cause an amendment of the edge, it is suggested that the applications be dealt with at a local level, in keeping with the applicable legislation, with public consultation at a wider community level, rather than the normal site focussed neighbourhood level.

Applications that cause amendment of the edge. Like the aforementioned case, the assessment of the proposed development includes the issue of compliance with the applicable policy and the suitability and nature of the proposed use in the affected environment. The purpose of the edge in that specific location must be considered together with the compatibility of the proposed urban use and the rural use that would in future be outside of the edge. All the other factors and issues discussed above remain applicable to this type of application, especially if it concerns an urban area that has little of no growth potential in terms of the assessment done for the PG:WC.

In addition thereto, there must be a cost-benefit analysis of the proposed development, to assist the authorities in coming to a decision on the application. The long term cost of development outside of the edge has been highlighted above. These are real costs and they are often ignored in decision-making, as the calculation thereof is either seen as superfluous, or the decision-makers believe (erroneously) there are no grounds for requiring such calculations (the Land Use Planning Ordinance, 1985, Ordinance 15 of 1985 requires consideration of desirability only and cost assessments are seen as a need issue). The developer, whether public or private, benefits from the false economies of scale of development outside of the edge and the community has to bear the long term cost, especially if it is a low income community that has to bear the cost of transport in commuting and the lack of opportunities for shopping, access to jobs, schools and all the other negatives related to segregated development.

On the other hand, the benefit of including land suitable for development as a trade-off for the acquisition of environmental assets and resources should be considered, as the cost of amending the edge could well be offset by allowing development that is economically sustainable and contributes to the establishment of opportunities that would otherwise have been a cost to the community.

The suggestion is however that the decision on an application that causes an amendment of the edge be dealt with at a provincial or higher administrative level, in keeping with the applicable legislation, unless all the criteria, principles and policies can be adhered to in the amendment, in which case it could become a local matter by delegation. This would reduce the “market” pressure put on local authorities to extend the urban edge, as was established during the field research, and allow for thorough consideration of all the costs and benefits. This type of application is at the level of an amendment of a spatial development framework, therefore public consultation at a community or sub-regional level would be advisable.

Applications that cause development outside the edge. Any application for urban related development outside of the urban edge, in keeping with the definitions of the edge and urban use above, should be assessed as a special case. The current development trends, i.e. for the establishment of gated villages, golf resorts and villages, rural neighbourhoods and coastal hamlets, cause this category to be of special concern. It is not the intention to label urban development outside of the urban edge as undesirable or to suggest that it unacceptable and may not occur. It is however suggested that in special

cases, where the urban edge cannot be extended and leapfrog development is a better option than urban expansion, then a new urban area with its own urban edge should be considered. The nature of the development should however then reflect the entire range of urban social and economic characteristics in relation to its size, e.g. social stratification as opposed to social exclusion, mixed residential densities and a range of residential choices as opposed to exclusive "luxury homes" or on the other hand exclusive subsidy housing for the lowest income groups (thus perpetuating segregation development practices), community and institutional facilities and mixed use as opposed to mono-functional or bi-functional (golf / residential, agriculture / residential, resort / residential) use and unrestricted public access to the newly established urban area as opposed to access controlled gated villages.

All aspects of urban edge determination and management become applicable to applications in this type of case, as a new edge must be established and managed. It however adds an additional dimension to the consideration of the land use and environmental authorisation applications, namely the establishment of a new urban edge.

A decision on an application for new development outside of the urban edge requires interaction between all levels of government, in keeping with the applicable legislation and with public consultation at a regional level. Depending on the nature of the application and the applicable legislation, it is suggested that the decision be taken at a provincial level. This type of application is also at the spatial development framework level, therefore public consultation at a regional level would be advisable.

Affect an edge management area. As stated above, it is not only the urban edge that requires definition and management, but also the land identified for growth inside and outside of the edge. It may seem anomalous to refer to an identified growth area outside of the urban edge. However, it is an indirect identification by implication, rather than designation. The urban edge management guideline includes the indication of priority growth areas and the succession of preferred edge amendments. This is best explained by means of example : *If the urban area is bordered by high intensity agricultural use on three sides and a wetland on the remaining side and there is a need to establish an industrial use in the urban area to add value to the agricultural sector, with resultant demand for housing and other development, then the urban edge must be expanded to accommodate the development, i.e. there is no vacant or under-utilised land for infill or redevelopment in the urban area. The wetland is indicated as a unique and sensitive system, therefore expansion would have to occur into the agricultural land. The question is : On which of the three sides, i.e. along which segment of the edge?*

In determining the urban edge, there would have been an assessment of the criteria, i.e. the relative importance, sustainability and use of the agricultural units outside of the edge would have been determined, as not all would be equal. Thus, the edge along the least important or sustainable of the agricultural uses would be designated as the first for amendment, i.e. as the lowest priority edge, with due consideration of the intended use inside and outside of the edge and the compatibility of the uses. The first priority edge would be the wetland, i.e. it would be the last edge that could be amended and then only for suitable use. The second and third priority edges could in the process also be amended for the purpose of the establishment of the example use, e.g. the industrial use, that is not compatible with the residential use and it could thus be used to support the longer term preservation of the higher priority edge, as it is unlikely that there would be as much demand for industrial growth as there is for residential.

The principle is that each segment of the edge must be designated with a priority ranking. There could be segments with similar rankings or segments with rankings for specific uses. This would then by implication indicate the identified growth areas outside of the edge,

which could either result in land speculation (as an established weakness of urban edges in the literature research) or legal development that would increase the value of the land, e.g. construction of farm infrastructure and buildings or establishment of orchards, vineyards or plantations or any other legal action to benefit from the situation.

In the case that vacant, under-utilised or developable land within the urban area is indicated as the preferred development area, prior to any amendment of the edge, a similar situation could occur. The land owner could frustrate the development succession by inflating the price of the land or by using it for other purposes to prevent its use for whatever it was indicated in terms of the planning frameworks. This would lead to "land banking", where the national, provincial or local government acquires the land or zones the land, i.e. acquires the development rights for the intended use, if it is privately owned.

Claims and cases of this nature would have to be settled in terms of the applicable legislation, regulations and policies and a case history would have to be built in the judicial system to determine how each situation should be handled. The provisions for the expropriation of land allows for expropriation for development intended for the benefit of the public and in keeping with declared state needs, thus the land could be acquired fairly rapidly, albeit at market related value, which could be settled through It is thus suggested that urban edge management areas be included in the legal framework relating to land use management together with the determination and delineation of urban edges. This would put all aspects of urban edges on an equal footing with land use zoning and other legislated management practices and establish an equitable and just system from the outset.

4.4 Edge Uses

Land use inside and outside of the urban edge plays a significant role in the management of the edge.

The intensity of use at a high priority edge should be low and primarily residential. Aesthetic and other development control measures must be introduced in low density edge developments, to ensure the least possible impact on the attraction of the edge environment. The development should allow maximum use of the land for open space networks or biodiversity corridors, i.e. soft edges. This would cause the residents of the edge area to make use of the facilities inside of the more intensely developed urban area, as no such uses should be permitted in the low density edge development. Sufficient transport infrastructure should therefore be established to allow for the interaction between the edge and the more centrally located high intensity use areas where the facilities are located.

Low priority edges should be supported by suitable development, i.e. roads leading up to the edge, the development of mixed uses to cater for longer term development and services infrastructure that could be extended, in keeping with the spatial development proposals for the land outside of the low priority edge. The layout and development parameters for the development along a low priority edge need not differ from any of the development elsewhere in the urban area.

Where low density mono-functional edge uses are established along the high priority edges, they would obviously place pressure on the facilities inside of the urban area, albeit planned and purposely, in order to achieve integration and to maintain the central uses that would otherwise become under-utilised. Edge uses should thus contribute to the maintenance and upgrading or expansion of the facilities through special levies that are dedicated to special funds that are used only for the upgrading of schools, clinics, libraries and other similar public facilities that would otherwise have established in the development. A special road

access levy would also be required. Alternatively, the developer of an edge use should upgrade the road infrastructure that would be used for access to the facilities, as the cost of road improvements and long term maintenance should not be placed on residents that are not the cause of the additional burden on the authorities through rates and taxes.

Agricultural smallholdings are not in any way ideal or desirable edge uses. The low density residential development that is suggested as an edge use, refers specifically to clustered development on residential erven with large open space networks or biodiversity corridors between the clusters. Golf course developments or sustainable, economically viable, agricultural uses are examples of "open space network" developments.

4.5 Edge Management Decision Support Model

The edge management decision support model follows a simple checklist approach. It is intended to alert the officials who deal with the edge related matters of all the criteria and issues involved. It does not provide the answers to the questions, but rather creates an awareness about questions that need to be asked and assessments that need to be done, either by the proponent in the case of an application or by the role-players in a spatial planning process, before a decision is reached on a case.

The model should be adapted to fit the applicable legislation and the detail aspects of land acquisition and expropriation. It should also make provision for the calculation of development costs, as the cost of services maintenance, public transport and bulk supply often becomes a financial liability for the local authority, whereas the developer simply walks away from the development having installed all the services and in some instances bulk, link or connector services. Even then, the cost development outside of the urban edge should be determined and levies calculated to ensure that there is sufficient provision for the supply and maintenance services.

5. CONCLUSION

5.1 Urban Edge Guidelines

Urbanisation and urban growth in the Western Cape negatively affects the environment, which is a significant socio-economic resource. The development trends are probably not sustainable, as it causes losses in agriculture, which is a large employment sector, and it detracts from the natural environment, which is a major attraction in the tourism and the development sectors. Low density sprawl and outward growth of urban areas also increases the cost of living for many residents while the cost of service provision to these residents is considerably higher than where it would be in more central locations. These trends therefore need to be reversed or managed.

Legislation places an obligation on all authorities to employ policies, administrative practices and laws that promote efficient and integrated land development. Thus, the Provincial Government of the Western Cape must act to ensure that efficient growth management policies and guidelines are employed in support of sustainable development in the province.

These policies and guidelines therefore aim to reduce urban development on land that is better suited for conservation as environmental assets and resources.

5.2 Urban Growth Issues

Urban growth, for whatever reason, has traditionally focussed on the edge of the urban area, where there are perceived economies of scale in development, albeit false economies, as the long term costs thereof more often than not outweigh the short term benefits to the developers. Market pressure, habit and the inability of communities to integrate, continue to put pressure on the urban edges while there are many opportunities within the edge that could be used for alternative development.

Urban edges offer opportunities to local authorities to manage growth temporally and spatially, however it requires a complex assessment of the situation. Amongst others, the correlation of the growth rate of the population in the urban area with the space required and the space available for growth, densification and redevelopment, must be undertaken. Land audits and the determination of development opportunities within the urban area form part of this process. The infill and redevelopment opportunities must be highlighted in spatial frameworks and services plans, as they should be related specifically to management of the urban edge. These opportunities are at best temporary measures, as growth will eventually exceed the opportunities for densification and utilisation of alternative land.

5.3 Initial Urban Edge Field Research Issues

Urban edge delineation is the first step in the establishment and management of urban edges as a planning and land use management tool. The delineation criteria and the factors to be considered in the management of an urban edge are not universally applicable. Therefore, urban edges would have to be determined on the merits and in the context of each case and for each sector, knowing that the long term effect thereof has wide ranging consequences for the urban and the rural uses affected by the edge determination. The precautionary principle (where a risk is unknown or uncertain, then provision must be made for the worst case scenario) must apply in all edge delineation studies, as inclusion of land within the urban area would probably lead to its loss as an environmental resource, while exclusion offers the opportunity of reconsideration as time passes.

The urban edge must be an exactly defined and delineated boundary, whether along a cadastral boundary, topographical feature, services infrastructure or along a co-ordinated line. Its management will depend on the exact delineation. An edge zone or other broadly defined buffer rather than a line has the potential of causing confusion and allows too wide an interpretation to be of use as an edge. Thus, the edge buffers are use zones along the in or outside of the edge, where the use is specifically managed in a manner that supports the edge.

5.4 Edge Management Guidelines

Urban edges are not simply containment measures, but also development management tools, determining the priorities and sequence of development outside of the current urban areas. The edge could be used to indicate which land is least desirable from an environmental perspective, e.g. low value soils, flat featureless terrain, far from water sources or previously disturbed by services infrastructure, which could be incorporated into the urban area for development first, then lastly the high value soils, land with conservation potential and intensively cultivated agricultural land, which would only get incorporated into the edge if no alternative exists. This would translate into wide and tightly drawn edges respectively. The opportunities created by the edge determination and the costs and benefits need to be considered in each case, as the edge is not uniquely a limiting tool. It must also be used as an enabling mechanism.

The edge could conversely be used to indicate which land is most desirable from an economic or social perspective, e.g. availability and use of existing services infrastructure, creation of opportunities for underdeveloped communities while limiting growth in developed communities, which would be drawn generously wide of the existing urban area, depending on the combination of factors used for edge determination. The point is that the three factors that effect human well-being, namely the social, economic and environmental factors, must be evaluated, prioritised and used for edge management purposes.

Due to its importance in the management of urban growth, the urban edge must be indicated on a detailed cadastral and topographic map as part of a spatial development framework, together with the table setting out the priorities, purpose, use inside and outside of the edge for each sector of the edge, i.e. for each part of the line. Where there are edge management areas, these also need to be related to the edge sectors. The distance of the line from the current built or developed area must be explained in terms of the need for space as an indication of the growth rate over a five-year period, together with a motivation of what alternative options, including infill and densification have been considered and why these are or are not suitable. Thus, fixed urban edges are not possible and would detract from the value thereof as a growth management tool.

Decisions relating to the urban edge could be taken at the local level, with due consideration of the impacts, if the edge uses are changed. If the edge has to be amended, full compliance with all the criteria and policies at a local level or a decision at provincial level seems the best way of dealing with the case, as with development outside of the edge.

There are various fields of expertise required when decisions relating to an urban edge have to be taken. These include urban planning, engineering services, agricultural production, nature conservation, ecological processes, catchment management and social development, in order to apply the edge determination criteria and the edge management policies and guidelines.

6. RECOMMENDATIONS

The recommendations relating to the guidelines are made in the light of existing land use planning legislation, planning policies and statutory processes and procedures. Whilst these do not specifically address the issue of urban edges, there are sufficient references to the obligation on local authorities to manage the urban areas under their jurisdiction efficiently and on all authorities to care for the environment. Therefore, in view of the current law reform process in the Western Cape, the first recommendation is that urban edges must be incorporated into legislation. Urban edges must be incorporated into the applicable legislation of the Western Cape, to place an urban edge into the same sphere of significance as spatial development frameworks.

6.1 Recommendations Relating To The Establishment Of Urban Edges

6.1.1 Urban edges must not be universally determined in a top down approach and must not be determined through legislative processes. Legislation must only cause urban edges to be determined for every urban area in the Western Cape.

6.1.2 The determination of urban edges must be undertaken by local authorities, with due consideration of the growth potential of the area, the local situation and the context within which each part of the edge is being determined.

6.1.3 Urban edges must be determined, delineated and defined by following the guidelines set out hereafter :

§ The edge must be determined to :
- Exclude prominent landforms and environmental character areas from the urban area ;
- Exclude valuable soils for agricultural purposes ;
- Exclude valuable soils for mining purposes ;
- Exclude surface and ground water resources that could be used to produce potable water ;
- Exclude surface and ground water features ;
- Exclude ecological resources and establishing suitable biodiversity corridors to link resource areas ;
- Exclude all statutorily declared, proclaimed and protected natural areas ;
- Exclude high intensity use and high potential agricultural resources and activity areas ;
- Exclude scenic routes and routes of tourism significance ;
- Exclude cultural and heritage resource areas and sites ; and
- Exclude areas that have visual sensitivity, skylines, mountainsides, ridgelines and hilltops.

§ Services infrastructure that could impact on development, such as waste water treatment works and solid waste disposal sites must be excluded from the urban area and suitable buffers around the infrastructure and corridors to the urban edge must be established if long term development approaches such infrastructure.

§ Limiting development and growth to the area that could be serviced safely, feasibly and without impact on existing users with the available

services infrastructure, unless prior provision is made for the extension or upgrading of the services, new services networks and bulk infrastructure.

- Calculating the growth rate of the various sectors of the urban area and determining the extent of land required to cater for this growth, whilst simultaneously determining the extent of vacant and under-utilised land in the urban area that could be used to accommodate the sectoral growth and allowing only for the difference (land requirement) between the existing edge of development and the urban edge.

- Allowing for proven growth requirements outside of the edge for a minimum five and maximum eight year period, in keeping with the requirement for infill and densification rather than and before outward growth.

- Considering the tendency of development to locate and growth to occur along higher order roads, access routes and transport infrastructure.

- Utilising topographical features, identifiable lines and definable lines with co-ordinates rather than the cadastral boundaries of adjoining land units when delineating the urban edge.

- Ignoring land use applications for new development and insisting on development to progress in keeping with the priorities determined for the amendment of the urban edge, unless the benefits of the proposed use are proven to outweigh the short and long term costs and the development would make a significant contribution to the social, economic and environmental goals for the area.

- Ignoring ownership of land and existing land use rights and establishing urban edges in keeping with the environmental and social guidelines.

- Discouraging the establishment of unsuitable uses on the urban edge, i.e. informal settlements, shopping malls, high density housing and uses not compatible with the rural uses outside of the edge, unless the edge is a low priority edge for the purpose of urban restructuring.

- Creation of opportunities for the establishment of suitable informal businesses, e.g. brick-making, urban agricultural projects and small scale farming activities in buffer areas along the urban edge.

- Creation of opportunities to increase public access to natural amenities and prevent linear sprawl along natural amenities such as mountainsides, water bodies and the coast.

- Maintenance of the three “rural” Bio-regional Spatial Planning Categories (core, buffer and agricultural) outside of the edge.

- Establishing a policy for the increase in residential densities from the centre to the edge in all urban areas.

- Using the edge to direct and phase urban growth in the various sectors, by ranking the urban edge line segments in terms of priority for preservation of the edge.

- § Identifying land for specific development inside the urban area and retaining the edge until the available land has been fully utilised for the specific use.

- § Rezoning all agricultural land in urban areas to a suitable agricultural zoning and excluding it from the calculation of developable or under-utilised land where densification should occur.

- § Utilising the undeveloped segregation buffers between the old group areas and large vacant and under-utilised tracts of land where communities were relocated from as first priority land for infill development and opportunities to re-establish the low and middle income communities shifted to the edges.

6.2 Recommendations Relating To The Management Of Urban Edges

6.2.1 Urban edges must generally be maintained as a non-delegated function of local authorities, i.e. decisions relating to the amendment of urban edges must be a function of the Provincial Government of the Western Cape, unless the edge amendments and all aspects of the edge maintenance comply with the Western Cape Urban Edge Guidelines. Legislation must determine that amendment of urban edges in the Western Cape is a provincial function with grounds for delegation of some or all of the functions to local authorities.

6.2.2 Urban edge amendments that do not occur in keeping with the regional growth potential assessment of the urban area and the priority ranking of the edge segments, should be assessed at a level of strategic planning, i.e. applications must be subject to Strategic Environmental Assessment and amendment of the applicable Spatial Development Framework (SDF) and it must incorporate a cost-benefit analysis of the development.

6.2.3 Urban edge amendments that comply with the regional growth potential assessment of the urban area and the edge maintenance program set out in the applicable SDF, i.e. that follows the priority order for amendment and that follows on the use of all alternative development options identified inside the urban area for that segment of the edge, must be delegated to local authorities.

6.2.4 Urban edges must be reconsidered and adapted every three years according to the Western Cape Urban Edge Guidelines, in order to maintain sufficient reserve land for urban development or to adjust edge uses to create additional opportunities for middle and low income communities.

6.2.5 Provision must be made in the applicable legislation for the determination of development levies to be imposed on edge developments intended to act as buffers to further development along high priority edges, as public bodies in all spheres of government would have to incur costs to establish or upgrade facilities in the existing urban areas to cater for the mono-functional edge development.

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DECISION SUPPORT MODEL								
Action		**Purpose of edge**		**Criteria considerations**		**Priority ranking of affected edge**		
Development application received		**To protect :**		**Has cognisance been taken off :**		Low - adjustable edge	Medium - adjusted only if sufficient need is proven	High - edge not adjusted until all other options exhausted
- abutting the edge		A prominent landform or character area		Architectural design of the proposed use				
- amending the edge				Fences, enclosures and other boundary delineation measures				
- outside the edge				Is there sufficient road access to the edge to allow fire fighting and emergency access				
				Can the storm water system accommodate run-off from the natural slopes				
		Valuable soils - agriculture		Dust, use of agricultural chemicals and general farming operations				
				Integration of the rural use into the urban area as an environmental asset				
				Use compatibility - urban use impact on agriculture - pilfering, dumping, fire hazard				
		Valuable soils - mining		Dust, noise and general mining operations				
				Access to the resource for heavy vehicles				
		Hydrology - potable surface or ground water resources		Establishment of storm water management system to contain pollution				
				Allow maximum land surface for natural infiltration of water into soil - ponding				

				Wide buffer to allow natural functioning of the system				
		Hydrology - surface and ground water features, e.g. wetlands		Layout such that public has access to resource - erven do not back onto resource				
				Wide buffer to allow natural functioning of wetland system				
				Wide buffer to allow for flooding and high water levels				
		Ecological resources - aquatic		Is there a logical and efficient link or network				
				Wide buffer to allow natural functioning of the system				
		Ecological resources - terrestrial botanical		Is there a logical and efficient link or network				
				Wide buffer to allow natural functioning of the system				
		Ecological resources - terrestrial fauna		Is there a logical and efficient link or network				
				Wide buffer to allow natural functioning of the system				
		Ecological resources - biodiversity network		Is there a logical and efficient link or network				
				Does the public have open access to the network - erven do not back onto network				
				Wide buffer to allow natural functioning of the system				
		Natural areas or proclaimed conservation sites		Use compatibility - urban use impact - pilfering, dumping, fire hazard				
		High intensity / potential agricultural resources		Use compatibility - urban use impact on agriculture - pilfering, dumping, fire hazard				
				Dust, use of agricultural chemicals and general farming operations				

				Integration of the rural use into the urban area as an environmental asset				
		Scenic route or route of tourism significance		Wide buffer to allow meaningful experience of the environment				
				Form and design of adjacent development - allow clear view lines - height limits				
		A cultural / heritage resource		Wide buffer to allow meaningful experience of the resource				
		Visual quality of the area and impact of proposed use		Are sky lines or horizons affected				
				Space for landscaping and retention of natural elements of the environment				
		To create opportunities for :						
		Biodiversity corridors and open space network		Does network connect into urban area or is it continuous outside of edge				
				Wide buffer or sufficient space to allow natural functioning of the system				
				Are corridors accessible to the public				
				Is there a management plan / program, including finances for the maintenance				
				Is there a development agreement to cover the development nature and costs				
		Growth requirements over 5 year period		Has alternative development land been used				
				Use of land in and outside of edge - opportunities for low income residents				
				Has allowance been made for time delay in land use planning process				
				Has growth rate of population been equated to need for land				
		Growth requirements over 10 year period		Has alternative development land been used				

				Use of land in and outside of edge - opportunities for low income residents				
				Where will bulk services be established				
				Has growth rate of population been equated to need for land				
		Social housing needs		Do any infill opportunities exist elsewhere in the urban area				
				Is expansion towards other urban area - future integration opportunity				
		Urban agriculture and small scale farming		Are there alternative opportunities for the farmers				
		Densification of residential neighbourhoods		Have alternative development options been exhausted - redevelopment of land				
				Is the services infrastructure fully utilised				
				Has ideal density in terms of spatial framework been reached				
				Grading of densities from centre outwards and along corridors				
		Community based job creation project		Are there alternative opportunities for the beneficiaries				
				Could change create new opportunities - projects related to development				
		Access to natural amenities (beaches, rivers, mountains)		Could change create new opportunities - increase access to amenities				
				Does the services infrastructure support access - if not, impose conditions				
				Environmental impact of linear development along amenity - run-off, visual, access				
		As a result of :						
		Buffer created by services infrastructure		Can servitude area be used as a biodiversity corridor				

				Does buffer create opportunities for job creation projects or small scale farming				
				Access to corridor - emergency and public use				
		Limit of services infrastructure		Can services accommodate emergency action - fire fighting, flood management				
				Must new bulk infrastructure be established				
				Effect of bulk infrastructure on edge and environment outside edge				
		Extent of vacant / under-utilised land inside edge		Does the available land inside the edge cater for the demand				
				What is function of under-utilised land - urban agriculture or job creation projects				
		Use of higher order roads		Noise or view buffer				
				Access restrictions and development that detracts from rural experience				
		Use of access routes and transport infrastructure		Is existing infrastructure being used to the best potential				
				Are there public transport services available to cater for the demand				
		Land use and existing land use rights		Are the proposed uses compatible with the existing rights				
		Use of remainder of land unit or adjoining land unit		Is use inside edge compatible with use outside - distance and buffer				
				Fire, chemical, noise or dust hazard caused by use outside				
		Availability of developable land in urban area		Have all options for infill and redevelopment been exhausted				
				Are services in urban area being used to the best potential				
		Legal status of adjoining land - proclamation		What are the regulations relating to development on abutting land				
				Do services envisaged for edge use make provision for extension				

				Are services envisaged for edge use able to serve use outside				
		Bio-regional spatial planning categories (buffer or transition area)		Is the proposed use compatible with the bio-regional framework				
		As a result of :						
- affecting an edge management area		Development adjacent to alternative development site		Does the proposal comply with the SDF proposals				
				How does development affect management site (mitigation/integration)				
		Development of alternative development site		Does the proposal comply with the SDF proposals				
				Best possible use - maximising opportunities				
				Edge reconsidered - time delay and SDF process				
		Development outside of edge conflict with long term use		Does the proposal comply with the SDF proposals				
				What are implications - cost, use, use inside, access, services				
		Development outside of edge in conflict with urban use		Does the proposal comply with the SDF proposals				
				How does development affect management site (mitigation/integration)				
				Alternative use possible inside edge and alternative edge area developable				
		Development inside edge conflict with intended long term use		Does the proposal comply with the SDF proposals				
				Do services to development area and for development have sufficient capacity				
				Alternative edge area developable				