

5.5 Supporting Sustainable Environmental Management

The effective management of the City's environmental resources and the pro-active enforcement of environmental legislative are key to developing a sustainable and quality living environment for all of the City's users. Defined open spaces function as ecological, social and institutional structuring elements that contribute directly to the preservation of the City's heritage. Given the development direction of the City and the ever-changing living conditions of citizens, clear guidance on environmental management issues is required in order to ensure that the City's environmental resources are protected and enhanced.

i. Development Paradigms

Establishing and maintaining a connected open space system and addressing environmental challenges such as air and water pollution will actively support the following GDS development paradigm:

- Sustainability and Environmental Justice

ii. Sector Plans

The Environmental strategy addresses the following sector plans of the IDP and associated long-term strategic interventions and indicative 5-year strategic objectives:

SECTOR PLAN	LONG TERM STRATEGIC INTERVENTIONS	INDICATIVE 5-YEAR STRATEGIC OBJECTIVES
Spatial Form and Urban Management	Develop principles, frameworks, and practices to ensure that spaces and specific development adhere to good standards of urban design.	Design and implement codes to create safer communities, legibility, functionality and aesthetics of the urban environment.
	Undertake effective urban management	Quality improvements in the urban environment and improvements in citizen satisfaction with quality of life
Human and Community Development	Improve the opportunities for citizen interaction through attractive and accessible public spaces	Increased number of developed public spaces (other than formal parks) where citizens can interact freely and safely
Environment	Preserve and expand the city's urban forest and enhance the performance and integrity of ecological systems (flood attenuation, drainage areas, wetlands etc) through greening of the existing built environment and new developments	Expand the number of trees on sidewalks and in parks and private properties by 100,000 Ensure that at least 5% of buildings in the city have green cover
	Retain, conserve and expand the city's open space network	Establish a network of open spaces that contribute to social and environmental opportunities.
	Conserve and preserve sensitive habitats and biodiversity by protecting formally recognised conservation areas.	Increase in the total land area of Johannesburg proclaimed as conserved nature area (still to be determined through research).
Health	Manage the urban environment, through effective monitoring and, where necessary, enforcement of relevant legislation to reduce conditions that foster health risks	An integrated and well-resourced system in place for environmental health certification, monitoring and enforcement

This strategy is based on the explanation of the principles of the Integrated Environmental Management Framework the Johannesburg Open Space System (JMOSS), the recently endorsed Open Space and Catchment Management guidelines, This framework of supporting development guidelines and environmental principles is applicable to all new developments within the City.

5.5.1 Integrated Environmental Management Framework

The City recognises the principle that for real long-term sustainability, development must be socially, economically and environmentally sustainable. Increasing economic growth and improved levels of production and consumption should also be accompanied by the responsible use of environmental resources and the promotion of environmental best practices.

The following principles apply to all land development within the City:

- **Sustainability:** The City of Johannesburg should at all times strive for sustainable development, that is, development that meets the needs of present generations without compromising the ability of future generations to meet their own needs.
- **Ecological limits:** Recognising that the natural environment is the resource base upon which all other development depends, all citizens and communities must learn to live within the Earth's carrying capacity, using resources in a judicious and sustainable manner.
- **Cradle to Grave:** Responsibility for the environmental, health and safety consequences exists throughout the life cycle of a policy, activity, service or product, beginning from conceptualisation through implementation to disposal, cessation and/or decommissioning, and including all externalities and environmental costs.
- **Accountability and "The Polluter Pays" Principle:** All stakeholders should be responsible for their decisions and actions, and those responsible for environmental damage must pay the costs of repair, remediation and/or rehabilitation, as well as any costs incurred in preventing further pollution and environmental damage.
- **Duty of care:** Every citizen should be responsible for taking care of the environment and should take appropriate action where possible if the environment is polluted.
- **Equity and justice:** There must be equitable access to environmental resources and the environmental injustices of the past must be remedied.
- **Encourage a participatory approach:** All stakeholders should be involved in sustainable development and should participate and collaborate in planning and decision-making, taking collective responsibility.
- **Access to Information:** All information should be accessible and available to the public.

5.5.2 Johannesburg Metropolitan Open Space System (JMOSS)

The foundation of JMOSS (**Map 35**) is an inter-connected and managed network of open spaces supporting interactions between social, economic and ecological activities, sustaining and enhancing both ecological processes and human settlements. Open spaces, such as roads, pedestrian paths and linear parks, can provide a network connecting public transportation routes and important community facilities such as libraries, schools and sports facilities. Such inter-connected open spaces also enhance ecological diversity by providing habitats for the City's fauna and flora. A connected system of open spaces is required to minimise storm-water run-off and therefore help to protect the City's rivers and streams. In addition, open space and environmental considerations should enjoy precedence over development considerations in areas identified with high conservation or recreational potential. Specifically, this refers to:

- Ecologically sensitive areas;
- Areas where the linking of open spaces to form a continuous system is required; and
- Where restoring the ecological balance in a built-up area is required.

The objectives of JMOSS are as follows:

- To provide a cohesive, holistic view of the nature and purposes of an open space system and generate approaches that will most likely lead to its establishment;
- To formulate a perceptual model that can be used to identify the types of land most worthy of inclusion within an open space system;
- To propose a methodology, which, if applied, would be most likely to bring any potential open space into effect;
- To determine suitable boundaries for the City's Metropolitan Open Space System;
- To provide a holistic view and analysis of existing open space;
- To identify those potential open spaces that occur throughout the metropolitan area that are worthy of inclusion in an open space system based on applied criteria; and
- To assess existing and potential open space that should constitute the MOSS.

The current definition of open spaces as used in JMOSS is as follows: *“Any undeveloped vegetated land within and beyond the urban edge, belonging to any of the following six open space categories: ecological, social, institutional, heritage, agricultural and prospective (degraded land).”*

The six categories of open space relate to current land use as well as provincial planning and decision support tools (e.g. Gauteng Open Space Plan). Each of these categories has a number of sub-categories, the inclusion of which has largely been dictated by the availability of spatial data. These are noted in **Table 5.23**.

Table 5.23: Categorisation of Open Space

MAIN CATEGORY		SUB-CATEGORIES
Ecological open space	Existing	<ul style="list-style-type: none"> • Nature reserves • Botanical gardens • Water bodies (buffered by 50 m) • Undeveloped ridges • Bird sanctuaries • Nature trails
	Desired	<ul style="list-style-type: none"> • Areas of "high" conservation value (as determined by specialist ecologist) • Areas with "high" habitat diversity (as determined by specialist ecologist) • Areas with a low disturbance (as determined by specialist ecologist) • Red Data fauna (from GDACE) • Red Data flora (from GDACE) • "Natural" land cover categories
Social open space		<ul style="list-style-type: none"> • Zoological gardens • Sports facilities • Recreational facilities • Places of interest • Places of worship • Libraries • Community centres
Institutional		<ul style="list-style-type: none"> • Municipal facilities • Airports/airfields • Educational facilities • Public service facilities (e.g. police stations, post offices etc.) • Health facilities (i.e. hospitals and clinics) • Cemeteries
Heritage		<ul style="list-style-type: none"> • Historical monuments • Museums • Art galleries • Cemeteries of historical importance • Archaeological sites • Cultural sites
Agricultural		<ul style="list-style-type: none"> • Agricultural lands (including urban agriculture)
Prospective open space		<ul style="list-style-type: none"> • Refuse sites • Mine dumps • Slimes dams • Landfill sites • Mining land & quarries

Table 5.24: Environmentally Sensitive Areas per Region

Environmental Aspect	Region A	Region B	Region C	Region D	Region E	Region F	Region G
Ridges		Northcliff Westcliff Melville Koppies	Quellerina Roodekrans Roodepoort & surrounds Bram Fischerville		Houghton Linksfield	Houghton Klipriviersberg-berg	
Wetland	Farm Waterval	Porcupine Park	Constantia Kloof Wilgeheuwel Bram Fischerville Honeydew Strubensvalley	Mapetla Greater Soweto	Farm Waterval		Lenasia
Egoli Granite grassland	Farm Waterval		Farm Roodepoort				
Conservation Areas			Kloofendal Little Falls Resort Entomological Resort Walter Sisulu Botanical Gardens Cosmo City Conservation Area		Modderfontein	Klipriviersberg-berg	
Dyke			North Riding A.H Boundary Park Northwold Brushwood Haugh A.H.				
Dolomitic Areas	Ivory Park			Protea Glen Doornkop		Eikenhoff	Lenasia
Previously Mined Areas				Diepkloof Noordgesig Riverlea Doornkop		Crown Gardens	
Bushbaby	Craigavon Salfred Witkoppen Fourways						
Giant Bullfrog	Glen Austin Blue Hills Witpoort		Farm Nietgedacht Witkoppen / Montecasino				
Urban Agriculture				Doornkop Slovoville Dobsonville Orlando Dam			Orange Farm

Desired Qualities of Open Spaces in the City

JMOSS defines the desired qualities of open spaces as follows:

Equitable/Accessible:

Every neighbourhood should have open spaces that are:

- Inviting and accommodating;
- Located throughout a community for all residents to access;
- Able to meet local or regional needs;
- Accessible;
- Suitable for use by multiple generations and differing cultures; and
- Safely accessible for individuals of various physical and cognitive abilities.

Safe:

Open spaces should not only be structured physically for safety, but perceived as havens for people of all backgrounds and abilities. Open spaces should not be centres of criminal activity.

Diverse:

All community residents and visitors should be able to access a variety of open spaces that support diverse uses. Open spaces should support a variety of uses and purposes and accommodate diverse user groups and thus have different sizes. Open space designs are adaptable over time to meet changing local and regional needs, without diminishing the experience of a coherent and unified space.

Connected:

A network of spaces enhances other public places and civic amenities. Communities and regions have networks of open spaces providing greater opportunities and more diverse experiences. Connected spaces enhance ecological diversity and functions. Open spaces are connected to public transportation and pedestrian facilities. Libraries, schools, courthouses, and other public facilities include open space.

Ecological:

Open spaces provide environmental benefits at multiple scales. Open spaces provide habitats, minimize storm water runoff, infiltrate groundwater and offer the community the opportunity to connect with nature.

Engaging:

Open spaces promote cultural understanding, interpret environmental and cultural identities and foster community pride. The design, materials and uses of an open space can reflect elements rooted in community values, history and cultural linkages. Open spaces help define a community and positively impact the physical, emotional, cognitive and spiritual growth of citizens.

Cared for:

Open spaces engender a sense of committed appreciation of nature in neighbourhoods, with many citizens devoting their time and resources to open space planning and management.

Funded:

Open spaces, like highways and wetlands, require investments to reap community benefits. The long-term success of open space also requires long-term commitment and maintenance to protect the quality of the environment and visitor enjoyment.

5.5.3 Open Space and Environmental Management Guidelines

As densities increase within the City, the need to preserve the finite open spaces is increasingly important and the City may be required to rehabilitate degraded and / or under utilised land to be able to provide quality open space environments to communities.

Supplementary Open Space Management Guidelines have been developed by the City and are integrated into this revision of the SDF for the first time. The guidelines are grouped into the following sub-sections highlighted in **Table 5.25**:

Table 5.25 : Supplementary Open Space Management Guidelines

	GUIDELINE	PRINCIPLES
A	Generic Guidelines Relating to Socio Economic Open Space	<ul style="list-style-type: none">• It is proposed that 2,4ha/1 000 population of socio-economic open space be provided;• This includes parks, sports fields and hard open spaces such as urban squares, provided such open spaces are easily <u>accessible</u> to the general public and not covered;• This excludes traffic islands and parking areas;• This also excludes ecological and undeveloped open spaces such as protected areas, high sensitivity vegetation and ridges; and• Flood areas can be included, provided that they are 'developed' for recreational purposes.
B	Areas With A Shortage Of Open Space	<p>Dense urban centres are characterised by high land values and a lack of suitable undeveloped sites on which to provide sufficient open space. As a result, it is a particular challenge to meet park and recreation needs within these areas. Moreover, dwelling units tend to be small and private space limited, which implies that open space standards should be higher than in other areas. Creative ways thus have to be found to address both the existing backlog and the future increase in need for open space as the traditional manicured park will not be achievable.</p> <p>The following strategies should be implemented to ensure effective open space provision despite the quantitative shortcomings:</p> <ul style="list-style-type: none">• Existing open spaces should be redeveloped to ensure that they continue to meet the needs of surrounding neighbourhoods.• Alternative open spaces to the traditional park have to be found. These can include:<ul style="list-style-type: none">○ Small vest pocket parks;○ The principle is that streets should have wider sidewalks, traffic calming, higher quality sidewalk paving and street furniture;○ Indoor spaces; and○ Terraces and rooftops.• Partnerships with other land owners have to be negotiated. Joint development and use of properties owned by other jurisdictions, such as school properties, can extend opportunities. <p>Negotiations should be undertaken with developers (specifically in the case of redevelopment) to provide open space that is accessible to the general public</p>

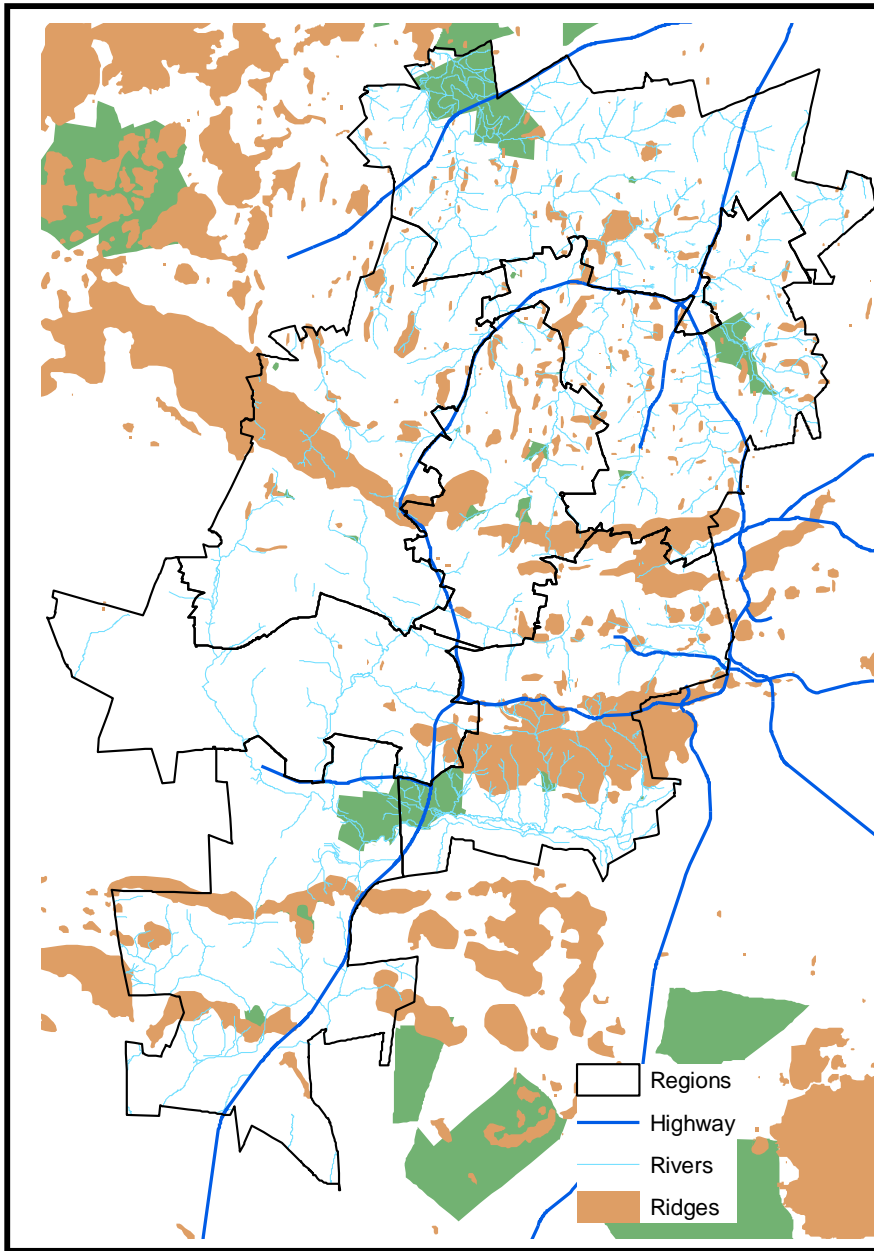
		on their erven in exchange for height and density bonuses for example.
C	Locations Subject to Densification	<p>Due to the envisaged densification and concentration of land uses within the context of the SDF and associated RSDFs the following strategies are proposed where a precinct or neighbourhood has been earmarked for densification:</p> <ul style="list-style-type: none"> • The development potential (density) for the entire area earmarked for densification should be determined. • The open space as well as social facility requirements for the entire area should be determined. • Suitably located land accessible to the public should be identified in advance to be acquired and developed for open space purposes • Existing open spaces should be redeveloped to ensure that they continue to meet the needs of surrounding neighbourhoods. • Negotiations should be undertaken with developers (specifically in the case of redevelopment) to provide open space that is accessible to the general public on their erven in exchange for height and density bonuses. <p>Within the City there are areas where densification has already given rise to shortages in open space. In these instances the provisions and strategies proposed for Low Income Residential Areas will apply.</p>
D	Low Income Residential Areas With a Shortage of Open Space	<p>Lower income areas (specifically townships) typically have much less generous park and recreation areas compared to higher income areas. The problem is fourfold:</p> <ul style="list-style-type: none"> • There is a historic under provision of open space; • Most open spaces are either undeveloped or underdeveloped and as such are often mere rubbish dumps or “dust bowls”; • Occupation densities tend to be high and even small increasing the need for open space; and • There is pressure for the use of open land for other pressing programmes such as housing. <p>As in the case of high-density residential areas with insufficient open space, alternative solutions should be employed.</p>
E	Large Land Users / Uses	<p>Built structures are often surrounded by large areas of turf that have little diversity and provide no return for maintenance. They are also potentially large contributors to pollution.</p> <p>Large land users present four specific opportunities:</p> <ul style="list-style-type: none"> • The fragmentation of open space within individual developments should be planned and keyed into a network of parks and linear connections. • Large sections of space should be naturalised in stead of manicured which would increase their value as potential wildlife habitats. • Their potential for ecologically based turf management with livestock, e.g. sheep and geese should be explored. • Stormwater attenuation: Owners of industrial properties should collect all their storm water runoff from their properties in sediment ponds before releasing it into river systems. In addition reed beds should be planted in or along the rivers at the outfalls to further filter the runoff.
F	New Development (Residential Expansion)	<p>The aim of the following guidelines is to address current shortcomings in open space provision in new developments and is based on the notion that open space must be planned as a land use in its own right. They are based on the premise that open spaces should be planned in the right location and should not constitute the “remainder” when other land uses have been provided. It should also be accessible, suitable, functional and usable and not merely an area included to satisfy required standards.</p>
G	Catchment Management	<p>A water catchment can be defined as a drainage basin which acts as a collecting basin for all water runoff into the watercourses flowing through that basin.</p> <p><i>“To conserve and enhance the watercourses and riparian zones within Johannesburg through implementing integrated catchment planning and management practices in order to protect water resources and to promote healthy aquatic ecosystems and riverine areas which support sustainable social and economic use to the optimal benefit of all stakeholders, including the environment.”</i> (Page 1, Draft Catchment Management Policy, Feb 2008).</p> <p>Johannesburg is one of very few cities in the world that lies on a continental watershed – i.e. is not directly affected by catchment areas beyond the metro</p>

<p>Catchment Management Continued</p>	<p>boundaries. Accordingly, the City alone is responsible for the condition of water leaving its boundaries and for the condition of its water courses.</p> <p>The City has two catchment areas:</p> <ol style="list-style-type: none"> 1. The Jukskei River catchment which covers a small proportion of the catchment of the Crocodile River that feeds the Hartbeespoort Dam to the north, 2. The Klipriver catchment, which drains south and which falls within the Upper Vaal Catchment. Streams or watercourses flow outward across the municipal boundary at some 28 locations, the most important being the: <ul style="list-style-type: none"> o Jukskei River in the north; o Klipriver in the south; o Wilge Spruit in the north west; o Kaal Spruit through Ivory Park, and o Simmer and Jack Stream, draining the industrial area east of the CBD to the Natal Spruit. <p>The following issues related to the catchments are prevalent within the City:</p> <ul style="list-style-type: none"> • Increased frequency and total volumes of runoff and increased peak discharges • Major changes in stream morphology as channels widen and deepen; • Increased sediment runoff and deposition; • Deterioration of biological, chemical and aesthetic water quality; • Increased debris load in runoff water; and • Reduced groundwater recharge. <p>The following floodplain guidelines are endorsed by the Spatial Development Framework:</p> <ul style="list-style-type: none"> • No reclamation of land or construction of permanent structures permitted within the riparian zone or within a buffer of 30 m from edge of riparian zone or the river bank where this is clearly identifiable. • No development of any type permitted within the 1:100 year floodline or within the riparian zone and a buffer area of 30 m from the edge of the riparian zone or river bank where this is clearly identifiable (outside the urban edge, buffer is increased to 50 m). • All areas below 100 yr floodline (or 32 m from centre of river whichever the greater) to be zoned "open space". • Relaxation of development controls only considered for special circumstances: <ul style="list-style-type: none"> o if required to protect existing development or infrastructure or if demonstrable net benefit to river health o if modifications to the riparian zone are required to address stormwater attenuation requirements to the satisfaction of the JRA and Johannesburg Environmental Management <p>Additional conditions relating to developments within floodlines are noted below:</p> <ul style="list-style-type: none"> • Buffer zone for riparian area – only permeable fencing, attenuation ponds • 50 yr to 100 yr – no structure causing loss of flood storage to system, no fill, berms or dykes, no structure that is not designed to engineering standard, no impermeable roads or parking areas, no facility that poses a risk to water quality, no agricultural activity which results in destabilisation of groundcover or poses risk to water quality • 20 yr to 50 yr – no permanent structures except bridge supports, only temp structures not interfering with function of ecological corridor or floodplain, no parking or roads • 10 to 20 yr – only ground level modifications that do not reduce the permeability of the floodplain soils or interfere with function of ecological corridor • Below 10 yr – only approved water abstraction facilities, approved landscaping, approved structures to control erosion <p>The following are additional guidelines relating to stormwater management and are proposed by the Johannesburg Open Space Framework.</p>
---------------------------------------	--

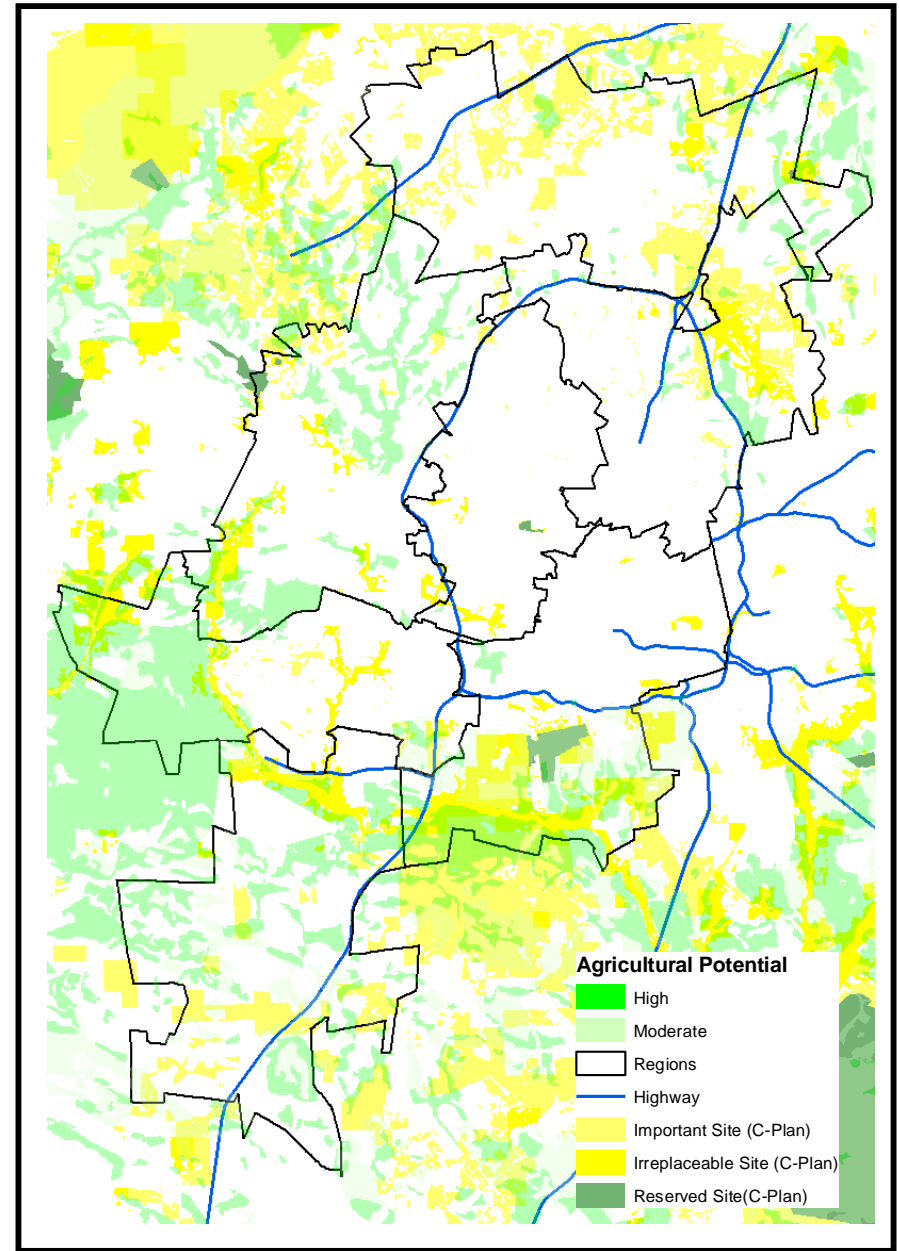
	<p>Catchment Management Continued</p>	<p>Stormwater Management</p> <p>Faced with the degradation of the natural watercourses and the other negative impacts of development on the environment, the Johannesburg Roads Agency (JRA) had enforced the concept of on-site attenuation since 2002. This approach is based on the requirements of the National Water Act, which clearly states that the flow in a watercourse is not to be altered in any way. Increased hardening of surfaces associated with development does just that.</p> <p>The attenuation policy adopted by the JRA is aimed at mitigating the negative impact of development on the environment associated with the watercourse and the riparian zone and is premised on the following:</p> <ul style="list-style-type: none"> • All developments on land exceeding 8,500m² are subject to stormwater attenuation on site; • The preferred means of attenuation is on surface; • Attenuation off-site, to compensate for the lack of an on-site facility is acceptable; • The runoff associated with the development is to be attenuated such that the predevelopment flows for the 1: 5 as well as the 1:25 – year storm events are not exceeded; The attenuation structure must be able to withstand the 1:50 - year storm event; • Discharge from the attenuation facility is subject to approval by the landowner downstream; • Site Development Plans will only be approved if supported by an acceptable stormwater management strategy; • Clearance for the issue of a Section 82 or Regulation 38 certificate will only be given once the stormwater management system is in place; • The proposed management of the attenuation facility is to be stated in the outline scheme report; • The design and sizing of the attenuation facility is to be carried out by a suitably qualified engineer. The design calculations must be submitted in a report that deals with catchment characteristics, pre - and post – development. The performance hydrographs of the proposed facility must be included in the report.
H	<p>General Guidelines</p>	<ul style="list-style-type: none"> • All new development increases the local population or attracts new people to an area and will therefore be required to provide open space of a suitable extent and nature. • Developers must negotiate with the City at an early stage of the planning process to determine the most desired open space provision i.e. open space needs, opportunities and preferred locations. • All planning phases for developments should follow a sustainable development approach (i.e. development providing basic environmental, social and economic services to all, without threatening the ecological and community). • Respect for nature and ecological processes: <ul style="list-style-type: none"> ○ Environmental aspects on any development site must be fully understood and must suitably inform all decisions and the development must respond to existing site features (i.e. rocky outcrops, existing trees, natural ground level) and trees. ○ New development should recognize the subtle topological features and native vegetation and develop new landscape, pathways, activities and civic places that protect and enhance these features. ○ The design of new buildings, walkways and landscape elements should enhance and develop existing parks, viewpoints, rivers and other open space elements and foster access to these natural areas. ○ The relationship between the built and natural environments should be reinforced through view corridors, pedestrian links, viewpoints and other features, that adds to the design quality of the city and helps to define and protect the character. ○ Where an application site contains ecologically sensitive areas, the development application must include these as protected open space. • Existing indigenous trees must be retained as far as possible. <p>During the design process, all established indigenous trees need to be assessed and information recorded showing: species type, size (height, canopy spread and trunk circumference) and location, along with a statement of the potential impact of proposals on trees.</p>

<p>General Guidelines Continued</p>	<p><u>Open Space Provisioning</u></p> <p>Sufficient open space should be provided on site.</p> <ul style="list-style-type: none"> • Cash contributions will not be accepted in lieu of Open Space provisioning unless a suitable site for alternative open space has already been identified and is obtainable. • Land provided in terms of Open Space Provisioning will be evaluated not only according to quantitative guidelines, but also according to the qualitative guidelines as established in the Johannesburg Open Space Framework. • Both hard and soft landscapes should be considered. • Safety and surveillance should be considered in the design of open spaces. Surveillance can be increased by placing roads on one or more sides of an open space and orientating developments to face onto open space. Designs should provide lighting, furniture and landscaping in a way that natural areas and open spaces can be used in a safe and secure manner. • Sidewalks should be adequately developed to accommodate pedestrians and cyclists. If necessary, additional cycling and walking routes should be provided in conjunction with open space provision. Private development must serve to address pedestrian circulation and movement patterns as a priority. The design of facilities must be such that clear differentiation is made between designated vehicular and pedestrian movement zones. • The developer must indicate how open space provided onsite links with adjoining open spaces and the open space network.
	<p><u>Development Adjacent To Existing Ecological and Social Open Space</u></p> <ul style="list-style-type: none"> • Any development adjacent to open space, whether social or ecological, must be compatible with the function and aesthetics of such open space in terms of land use, scale, massing, spatial interaction, appearance and landscaping. • Any development adjacent to existing open space must actively contribute to the protection and enhancement of the open space i.e. the development may not turn its back or storage areas onto the Open Space. • A Site and Landscape Development Plan of the development and its interface treatment with the Open Space must be submitted for approval. • The developer must landscape the boundary interface with the Open Space with endemic (local to the area) vegetation. • The development's interface must respond to the Open Space. • No solid fencing will be allowed on the communal boundary with Open Spaces. At least 50% of the fencing should be transparent allowing for the screening of backyards, where approved and the movement of species. • The development may not extend its activities onto the Open Space (parking, storage, dumping, earthworks, cooking ablution, accommodation, littering). • All disturbed open spaces along water bodies, especially the areas below the 1:50 and 1:100 year flood line should be rehabilitated with vleis / suitable riparian vegetation where possible.
	<p><u>Landscaping</u></p> <p>The following landscaping aspects are proposed by the Johannesburg Open Space Framework and are endorsed by the Growth Management Strategy.</p> <ul style="list-style-type: none"> • Landscaping and materials should be based on endemic species. • All Classified Invader Species must be eradicated and controlled on the development site. • No tree on the road reserve may be removed to accommodate entrances to the development. • One endemic 50 litre tree for every 2 parking bays must be provided to minimise the impact of extensive paved surfaces, i.e. increased heat generation, increased stormwater run-off, reduced potential for groundwater penetration; etc. Should parking bays be developed head-to-head, one tree must be planted for every four parking bays in conjunction with landscaped islands. The landscaped islands must serve to break the expanse of paved surface, must serve to reduce the environmental impact of the paved surface and must be planned with due consideration of pedestrian circulation and plant maintenance requirements. Trees often perform poorly when planted in areas with impermeable surfaces, suffering stress from lack of water and air. Providing more space around the tree is imperative, also to prevent the girdling of the tree.

General Guidelines Continued	<ul style="list-style-type: none">• In this regard a minimum of 1,5 x 1,5 meter openings will be required.• Where possible, developers must be encouraged to upgrade their adjoining road reserve, with specific reference to the planting of trees and formalisation of pedestrian walkways.• Bare walls (e.g. privatised garden walls in group housing schemes) must be softened with planting.• All new development should provide trees along streets and pathways chosen according to the regional tree-planting palette.• Full co-ordination of laying underground utilities and planting should be carried out at the early planning stage to ensure sufficient paving space is reserved for tree planting and to avoid problems of conflict during construction.
------------------------------------	--



Map 35 Johannesburg Metropolitan Open Space System (JMOSS)



Map 36 Areas of High Agricultural Potential