

DEVELOPMENT CONSTRAINTS AND DEVELOPMENT POTENTIAL FOR THE PROPOSED AVIANTO MIXED- USE DEVELOPMENT

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1. INTRODUCTION

The purpose of this document is twofold:

- A. To briefly discuss the proposed development in terms of the sensitivity map derived from the faunal, floral, wetland and aquatic analyses. Vegetation classification is used as a description of each mapping unit as this forms the basis of the nature of the ecological processes. The tables in section A describe the nature of the sensitivity units (Appendix A) as well as the development constraints and possible opportunities; and
- B. To discuss the development potential aside from the ecological sensitivity of the site (Appendix B).

It should be noted that the current document cannot accommodate all the detailed mitigation measures contained in each specialist report, but rather summarises them in the table below in order to provide an indication of the nature of suggested mitigation.

The final specialist reports and sensitivity map should form the basis of any decision-making.

2. LIMITATIONS

The consultant's opinion and suggested development opportunities as set out by this document is subject to authorisation by the Gauteng Department of Agriculture, Conservation and Environment (GDACE).

3. RECOMMENDATION

It is recommended that a layout be developed which builds on the principles and the development zones identified in Sections A and B of this report. Such a layout can then be assessed against the sensitivities identified. The final recommendation must incorporate the mitigation measures as stipulated by the specialists in their reports. The project team will then be in a position to motivate that GDACE make a decision on the environmental application.

SECTION A: DEVELOPMENT CONSTRAINTS (Appendix A)

Main Sensitivity	Unit	Vegetation Classification	Composite Sensitivity	Development Constraints	Development Opportunities
Primary Egoli Granite Grassland	1	Primary Egoli Granite Grassland	High	<ul style="list-style-type: none"> GDACE (2009) specifies that all primary grasslands should be designated as sensitive. Furthermore, Egoli Granite Grassland is classified as an endemic, and endangered vegetation type (Mucina & Rutherford, 2006); This portion of Egoli Granite Grassland forms part of a Class 2 ridge and is connected to a wetland system, thus increasing the conservation value thereof; This portion of Egoli Granite Grassland, including the valley-bottom wetland is large enough to be considered viable for conservation. The primary Egoli Granite Grassland and connected wetland system are considered as suitable habitat for faunal species, including Red Data species. <p>Buffer: GDACE (2009) specifies that a 200m buffer zone should be provided to delineated primary grassland areas to prevent deleterious edge effects. The majority buffer for this section of Primary Egoli Granite Grassland extends into neighboring properties while the eastern buffer overlaps with the R114 Road.</p>	<ul style="list-style-type: none"> The large portion of Egoli Granite Grassland should ideally be allocated as a conservancy within the development and could include hiking trails and bird hides. Other low impact activities such as overnight huts could be considered within the small footprint of the existing disturbances within the Primary Grassland; The low impact development such as small, limited overnight huts could be considered on the northern portion of this portion of Egoli Granite Grassland, depending on permission from the approving authority (GDACE). The huts must be unobtrusive and incorporate natural building principals, solar electricity and water tanks. These could be situated within the areas where the informal houses are currently situated; Grasslands benefit from fire as well as grazing. The environmental management plan must incorporate an appropriate burning programme in order to keep the grassland functioning optimally; OR Biodiversity offset: <i>“A proponent cannot approach the Department with an offset proposal at the outset of their application. The Department must first evaluate the development proposal and assess significance of residual biodiversity impacts to determine whether a biodiversity offset is appropriate. If a biodiversity offset is required, the applicant will be informed accordingly”</i>
	2	Primary Egoli Granite Grassland	High	<ul style="list-style-type: none"> GDACE (2009) specifies that all primary grasslands should be designated as sensitive. Furthermore, Egoli Granite Grassland is classified as an endemic, and endangered vegetation type (Mucina & Rutherford, 2006); This portion of Egoli Granite Grassland is connected to a wetland system, the riparian area and includes a rocky outcrop, which increase the conservation value thereof. It forms an ecological corridor along watercourses and 	<ul style="list-style-type: none"> Although this portion of Primary Egoli Granite Grassland is connected to riparian corridor systems and a class three ridge to the north, the conservation of unit 1 (above) could be suggested as a trade-off for the development on unit 2, excluding wetland, riparian and rocky outcrop areas; Furthermore, the northern sections of this unit are small in relation to the larger unit 1 and thus more susceptible to edge effects from the adjacent activities

Main Sensitivity	Unit	Vegetation Classification	Composite Sensitivity	Development Constraints	Development Opportunities
				rocky outcrops; and <ul style="list-style-type: none"> The primary Egoli Granite Grassland, connected wetland system and ridge are considered as suitable habitat for faunal species, including Red Data species, and provides a movement corridor for these species. 	and disturbances such as the footpaths; <ul style="list-style-type: none"> Wetland and riparian areas must be cordoned off should any construction activities be undertaken in this unit and the remaining sensitivities must be incorporated in open space planning (such as protected plants).
	3	Current utilized areas within the Primary Egoli Granite Grassland	High	<ul style="list-style-type: none"> Small informal housing and connecting roads exist within the Primary Egoli Granite Grassland, unit 1. The footprint of these houses and their impact on the surrounding grassland is minimal as their presence does not affect the ecological process of the grassland. Larger, residential development and associated services such as water and sewerage pipes will have detrimental effects on the grassland ecology. These areas are considered to be ideal conditions for opportunistic faunal species such as rats and mice but is not considered ideal habitat for important faunal species as recognized by GDACE (2009); 	<ul style="list-style-type: none"> The current footprint of the informal houses and existing roads could potentially be considered for low impact development; and The low impact development such as small, limited overnight huts could be considered on the northern portion of this portion of Egoli Granite Grassland, depending on permission from the approving authority (GDACE). The huts must be unobtrusive and incorporate natural (green) building principles, solar electricity and water tanks. These could be situated within the areas where the informal houses are currently situated.
Ridges	4	Class 2 Ridge	The section of the ridge that corresponds with the Primary Egoli Granite Grassland is awarded a High sensitivity classification	The Gauteng Ridge Policy (GDACEL, 2001) defines a ridge as any topographic feature in the landscape that is characterized by slopes of 5° (i.e. ≥8.8%, ≥ 1 in 11 gradient) as determined by means of a GIS digital elevation model (DEM). A Class 2 ridge indicates ridges that are 5-35% transformed. GDACEL (2001) specifies that no further subdivisions will be allowed on ridge systems and that consolidation of subdivisions will be encouraged. No-go development policy; low impact (e.g. tourism developments) will be considered requiring full EIA (including public participation exercise) with full set of specialist reports including (but not limited to): <ul style="list-style-type: none"> An ecological study, including both functional (ecological processes including connectivity function of ridge at a landscape level perspective) and compositional (biodiversity) aspects 	<ul style="list-style-type: none"> Low impact development in areas currently utilized on this Class 2 Ridge; and Open spaces with connectivity to adjacent open spaces should be incorporated into the design of the development and kept as natural as possible.
	5	Class 2 Ridge	High	<ul style="list-style-type: none"> The vegetation on this portion of a Class 2 ridge is disturbed and does not comprise pristine Egoli Granite Grassland. Instead the vegetation comprises <i>Hypharrhenia hirta</i> dominated grassland due to historic cultivation. Furthermore, a portion of this vegetation was completely cleared; 	

Main Sensitivity	Unit	Vegetation Classification	Composite Sensitivity	Development Constraints	Development Opportunities
				<ul style="list-style-type: none"> • A Red Data study for both fauna and flora • An invertebrate study • A hydrological / geohydrological study • A geotechnical study • A pollution study, including both air and water pollution • A social study, including cultural, historical and open space value aspects • A visual study • A study of service provision and access <p>• Ridges provide habitat for various faunal species due to their structural and environmental isolation from the landscape. They also function as a movement corridor providing connectivity between areas of open space.</p>	<ul style="list-style-type: none"> • Spoor confirming the presence of a small antelope species was found within this area although it is considered likely for this species to relocate to the open space system and pristine areas and therefore does not constrain development; • No rocky outcrops are contained within this portion of the ridge and no plants of conservation concern were identified within this area; • Confirmation of the GDACE classification of this ridge through surveys of the slope can be considered (The Gauteng Ridge Policy (GDACEL, 2001) defines a ridge as any topographic feature in the landscape that is characterized by slopes of 5° (i.e. ≥8.8%, ≥ 1 in 11 gradient); • Comprehensive conservation of the Class 2 Ridge (4) on the western portion of the site could be suggested as trade-off for the development of unit 5.
	3	Current utilized areas on the Class 2 Ridge	High	<ul style="list-style-type: none"> • Small informal housing and connecting roads exist on this Class 2 Ridge. The footprint of these houses and their impact on the surrounding grassland is minimal as their presence does not affect the ecological process of the grassland and ridge. Larger, residential development and associated services such as water and sewerage pipes will have detrimental effects on the ridge ecology; and • These areas are considered to be ideal conditions for opportunistic faunal species such as rats, mice and hares but is not considered ideal habitat for important faunal species; 	<ul style="list-style-type: none"> • The current footprint of the informal houses and existing roads could potentially be considered for low impact development; and • The low impact development such as small, limited overnight huts could be considered on the northern portion of this portion of the ridge, depending on permission from the approving authority (GDACE). The huts must be unobtrusive and incorporate natural building principals, solar electricity and water tanks. These could be situated within the areas where the informal houses are currently situated.
Hydrological Processes	6	Riparian area together with a 32m buffer zone	High	<p>Authoritative legislation, which lists impacts and activities on rivers that requires authorization are:</p> <ul style="list-style-type: none"> • Conservation of Agriculture Resources Act, 1983 (Act 43 of 1983); • Environment Conservation Act, 1989 (Act 73 of 1989); 	<ul style="list-style-type: none"> • No development should occur within the riparian area or its associated buffer zone. • The construction of road crossings or bridges could be considered but must be accompanied by the appropriate mitigation measures and a water use

Main Sensitivity	Unit	Vegetation Classification	Composite Sensitivity	Development Constraints	Development Opportunities
				<ul style="list-style-type: none"> National Water Act, 1998 (Act 36 of 1998); National Environmental Management Act, 1998 (Act No. 107 of 1998); and National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004). <p>GDACE (2009) specifies that development within the buffer zones of riparian areas will not be supported and further suggests that rivers within the urban edge should be buffered by 32m from the edge of the riparian zone</p> <ul style="list-style-type: none"> The Half Collared Kingfisher cannot be excluded from the site and therefore a buffer of 50 m from the edge of the riparian zone is required; 	<p>license.</p> <ul style="list-style-type: none"> Please refer to the wetland and riparian specialist report for further detailed mitigation measures relevant to riparian areas (SEF, 2009a).
	7	Wetlands together with their 30m buffer zone	High	<p>Authoritative legislation, which lists impacts and activities on wetlands that requires authorization are:</p> <ul style="list-style-type: none"> Conservation of Agriculture Resources Act, 1983 (Act 43 of 1983); Environment Conservation Act, 1989 (Act 73 of 1989); National Water Act, 1998 (Act 36 of 1998); National Environmental Management Act, 1998 (Act No. 107 of 1998); and National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004). <p>GDACE (2009) specifies that development within the buffer zones of wetlands will not be supported and further suggests that wetlands inside the urban edge be buffered by 30m from the edge of the temporary zone</p> <ul style="list-style-type: none"> The wetland systems on site are considered as suitable habitat for faunal species reliant on wetland or moist grassland systems, including Red Data species. Therefore developments should not occur within the wetland and associated buffer zone. 	<ul style="list-style-type: none"> No development should occur within the wetland and associated buffer zone. These areas should be cordoned off before construction activities commence. The construction of road crossings or bridges could be considered but must be accompanied by the appropriate mitigation measures and a water use license. Please refer to the wetland and riparian specialist report for further detailed mitigation measures relevant to wetland areas (SEF, 2009a).
Ridge	8	Class 2 Ridge	Medium	GDACEL (2001) specifies that no further subdivisions will	<ul style="list-style-type: none"> This portion of the Class 2 ridge is traversed by the

Main Sensitivity	Unit	Vegetation Classification	Composite Sensitivity	Development Constraints	Development Opportunities
				<p>be allowed on ridge systems and that consolidation of subdivisions will be encouraged. No-go development policy; low impact (e.g. tourism developments) will be considered requiring full EIA (including public participation exercise) with full set of specialist reports including (but not limited to):</p> <ul style="list-style-type: none"> • An ecological study, including both functional (ecological processes including connectivity function of ridge at a landscape level perspective) and compositional (biodiversity) aspects • A Red Data study for both fauna and flora • An invertebrate study • A hydrological / geohydrological study • A geotechnical study • A pollution study, including both air and water pollution • A social study, including cultural, historical and open space value aspects • A visual study • A study of service provision and access <p>• Ridges provide habitat for various faunal species due to their structural and environmental isolation from the landscape. They also function as a movement corridor providing connectivity between areas of open space.</p>	<p>R114 Road and is subjected to several disturbances. Furthermore, no natural grassland persists here. This ridge portion is thus classified as of medium sensitivity and development is recommended to occur here with mitigation measures – especially where these areas border the areas of high sensitivity.</p> <ul style="list-style-type: none"> • Please refer to the final faunal and floral specialist report for detailed mitigation measures appropriate for this unit (SEF, 2009a & b).
<p>Ridge Buffer</p>	<p>9</p>	<p>Class 2 Ridge Buffer</p>	<p>Medium</p>	<p>GDACLE (2001) indicates a 200m buffer of low impact development is required around class 2 ridges.</p>	<ul style="list-style-type: none"> • Low impact developments are allowed within these buffer zone areas. However, these areas are either transformed by existing building structures, invasive trees or cultivation. Ecologically, these areas are of low conservation importance, except for their location adjacent to primary grassland. It is suggested that development continue in this buffer zone, provided mitigation measures are met. • Please refer to the final faunal and floral specialist report for detailed mitigation measures appropriate for this unit (SEF, 2009b & c).

Main Sensitivity	Unit	Vegetation Classification	Composite Sensitivity	Development Constraints	Development Opportunities
	10	Class 3 Ridge Buffer	Medium	GDACEL (2001) indicates a 200m buffer of low impact development is required around class 3 ridges. This Class 3 ridge does not occur on the study site, but north of it.	<ul style="list-style-type: none"> • Low impact developments are allowed within this buffer zone area. Although this unit is small and not connected to the class 3 Ridge. It is suggested that development continue in this buffer zone, provided mitigation measures are met.
Secondary Grassland	11	Secondary Grassland	Medium	<ul style="list-style-type: none"> • The secondary grassland comprise sub-climax and <i>Hyparrhenia hirta</i> dominated grassland. The grassland includes protected and Gauteng Orange Data plant species and are therefore classified as medium sensitivity; and • Secondary grassland can provide habitat for faunal species but most are considered to be common species which are able to relocate to more prime habitat conditions. 	<ul style="list-style-type: none"> • Relocation of protected and orange data plant species to suitable habitats within the development; • Monitor and mitigate the continued survival of these plant species; and • Incorporate as much natural grassland as possible into open space planning.
Currently Developed Areas	12	Currently Developed Areas	Low	None	<ul style="list-style-type: none"> • The level of disturbance within these areas does not warrant the conservation thereof. Development can continue provided that mitigation measures are adhered to.

SECTION B: DEVELOPMENT POTENTIAL DIAGRAMME PER ZONE

ZONES	Normal						Impacted					
	Wetland & Wetland Buffer	Ridge	Ridge Buffer	Riparian Zone & Buffer	Egoli Granite Grassland	Asbestos Sites	Wetland & Wetland Buffer	Ridge	Ridge Buffer	Riparian Zone & Buffer	Egoli Granite Grassland	Asbestos Sites
Conservation Management Zones	X	X		X	X		X					
Possible Low Impact Development with Approval			X			X	X	X		X	X	X
Possible Low Impact Development			X						X			
Possible Normal Development												
Rehabilitation Management Zones						X	X			X		X

DEFINITIONS OF ECOLOGICAL ZONES

Wetland

National Water Act, 1998 (Act No. 36 of 1998) defines a wetland 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 land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.”

Wetland and Riparian Buffer

A buffer zone is an area of vegetation which begins from the boundary of a wetland’s temporary zone (wetland edge) or from the edge of the riparian vegetation and extends outward (Water Notes 4, 2000).

Ridge

A Ridge includes hills, koppies, mountains, kloofs and gorges and/or a landscape type or topographic feature that is characterized by two or more of the following features: a crest, plateau, cliff or footslope. In addition, ridges are characterized by slopes of 5° or more (that is equivalent to slopes of > 8.8% or > 1:11 gradient) when modeled in a Geographic Information System digital elevation model (DEM) that is based on 20m contour intervals at a scale of 1:50 000 (GDACEL, 2001).

Ridge Buffer

200m collar of land around the ridge that filters edge effects. According to the Gauteng Ridge policy, only low impact developments should be allowed within these buffer zones (GDACEL, 2001).

Riparian Zone

Riparian areas are used to determine the extent of the ecological footprint of a river (DWAF, 2005). The National Water Act (Act 36 of 1998), defines a riparian habitat as follows: “Riparian habitat includes the physical structure and associated vegetation of the areas associated with a watercourse, which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas.”

Egoli Granite Grassland

Egoli Granite Grassland is a poorly conserved vegetation type and is nationally classified as *Endangered*, indicating that this vegetation is facing a very high risk of extinction in the near future (Mucina & Rutherford, 2006). Pristine Egoli Granite Grassland comprises a mixture of various grass species and a high diversity of forbs (herbaceous plants).

Very little Egoli Granite Grassland is still in this pristine condition. The remaining pristine Egoli Granite Grassland is thus of high conservation value.

Impacted Areas

Impacted areas are defined for the purposes of this report as areas that have undergone some changes or breakdown in their ecological functioning due to natural or unnatural processes. The severity of these processes will determine the degree of impact.

DEFINITIONS FOR DEVELOPMENT POTENTIAL ZONES (Appendix B)

Conservation and management zones

Conservation and Management zones are identified areas that have a high ecological function and conservation importance due to a range of sensitivities as prescribed by National and Provincial policy regulations (GDACE, 2001; DWAF, 2005 & GDACE, 2009). These areas are big and intact enough with little to no disturbed or impacted areas. A feature of these areas would be that they are still connected to surrounding and supporting systems and that they are thus functional and worthy of conservation. These areas should be managed according to a conservation management plan to minimise the impact of surrounding development as well as to preserve the pristine state of the existing ecosystems and their connectivity to their supporting and supportive systems.

Low Impact Development with Approval

These are areas that have been identified as sensitive as prescribed by National and Provincial policy regulations. These identified areas, due to different impacts that have affected them, are however possibly of less ecological function and conservation value. These impacts will include but are not limited to fragmentation of sensitive areas due to other developments; impacts from agriculture, alien and invasive plant species, and mining. Low impact developments in these areas are possible if a process is completed whereby GDACE agrees to the transformation of these areas with mitigation measures through low impact development (see definition below).

Low Impact Development

“Low Impact Development (LID) is a more sustainable land development approach that begins with a site planning process that first identifies critical natural resource areas for preservation. Then, once the building envelope is established, LID techniques, such as maintaining natural drainage flow paths, minimizing land clearance, clustering buildings to minimize development footprint, and reducing impervious surfaces are incorporated into the project design. A series of small stormwater best management practices (BMPs) that preserve the natural features and hydrology of the land are used instead of the conventional methods of collecting, conveying, and piping away runoff”.

Normal Development

Normal Development is defined as any development that is allowed within the town planning scheme for the particular site and that have been approved by the necessary authorities. These developments should still consider low impact development principles and take cognisance of the fact that they might be next to sensitive ecological areas and that their development will influence those areas.

Rehabilitation Management Zones

Rehabilitation Management zones are identified areas that have a high ecological sensitivity as prescribed by National and Provincial policy regulations (DAAF, 2005 & GDACE, 2007). A feature of these areas would be that they are still connected to surrounding and supporting systems and that they are thus functional and worthy of conservation, however they have been impacted on by activity and undesirable natural processes. These areas should be managed according to a rehabilitation management plan to restore the full functionality of the system and enhance the functionality of surrounding sensitive areas.

Asbestos Sites

The asbestos sites are identified areas where asbestos has been dumped. These areas should be managed according to the Legislation guiding the treatment of asbestos (OHSA, 1993; NEMA, 1998; ECA, 1989 & NWA, 1998).

3. REFERENCES:

Department of Water Affairs and Forestry (2005): *A practical field procedure for identification and delineation of wetlands and riparian areas*. Department of Water affairs and Forestry. Pretoria. South Africa

Gauteng Department of Agriculture, Conservation, Environment and Landcare (2001): Development guidelines for ridges Version 6. Updated April 2006 (GDACEL).

Gauteng Department of Agriculture, Conservation and the Environment (2009): Requirements for Biodiversity Assessment. GDACE, South Africa

Mucina, L. & Rutherford, M.C. (2006): The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia 19*. South African National Biodiversity Institute, Pretoria.

Strategic Environmental Focus, 2009a: Avianto Mixed Use Development: Wetland and Riparian Delineation and Functional Assessment.

Strategic Environmental Focus, 2009b: Avianto Mixed Use Development: Floral Assessment.

Strategic Environmental Focus, 2009c: Avianto Mixed Use Development: Faunal Assessment

Legislation:

Occupational Health and Safety Act (OHSA) Act 85 of 1993)

The Asbestos Regulations (R773 of April 1987) promulgated under OHSA

National Environmental Management (NEMA) Act 107 Of 1998

Environment Conservation Act (ECA) Act 73 of 1989

National Water Act (NWA) Act 36 of 1998

Policy on the Handling and Disposal of Asbestos and Asbestos Waste in terms of Section 20 of ECA (1989)

Internet References:

Smart Growth / Smart Energy Toolkit

http://www.mass.gov/envir/smart_growth_toolkit/pages/mod-lid.html (26.05/2009)

APPENDIX A:

