



GA Environment

BRYANSTON EXT. 3B – ALIEN INVASIVE MANAGEMENT PLAN

BASIC ASSESSMENT PROCESS FOR THE PROPOSED BRYANSTON EXT. 3B HOUSING PROJECT AS PART OF THE RAPID LAND RELEASE PROGRAMME FOR THE GAUTENG DEPARTMENT OF HUMAN SETTLEMENTS, CITY OF JOHANNESBURG METROPOLITAN MUNICIPALITY

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GAUTENG PROVINCE
HUMAN SETTLEMENTS
REPUBLIC OF SOUTH AFRICA

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LAND RELEASE PROGRAMME FOR THE GAUTENG PROVINCE DEPARTMENT OF HUMAN
SETTLEMENTS, CITY OF JOHANNESBURG METROPOLITAN MUNICIPALITY,
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PROJECT INFORMATION

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Original	Prepared by	Reviewed by	Approved by
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1 INTRODUCTION

The Gauteng Department of Human Settlements (GDHS) is proposing to construct affordable housing on erven 3975, 3976, 3977 and 3978 in Bryanston Extension 3, Ward 104 of the City of Johannesburg Metropolitan Municipality (CoJ). The total area of the erven is 1.36 hectares (13 600m²) in extent and is currently zoned 'Residential 1'. A Rezoning and Consolidation Application (Reg. 20-04-2659) was submitted by the appointed town planners to the Town Planning department of CoJ. The project is part of the Rapid Land Release Programme (RLRP) which was launched in 2018 by the Premier of Gauteng Province, Mr David Makhura. The RLRP is a component of the broader land reform programme in the Province and the Republic of South Africa and is aimed at unlocking economic value through the release of properties to qualifying beneficiaries for various purposes which include housing as well as agricultural sites, commercials sites. The RLRP mainly aims to identify land parcels that are currently vacant, owned by either the National, Provincial or Local Government and can be allocated to qualifying beneficiaries.

In terms of the NEMA EIA Regulations, 2014 as amended: GN327 promulgated under Chapter 5 of the National Environmental Management Act (Act 107 of 1998) ("NEMA") and published in Government Gazette No. 40772 on 07 April 2017; a Basic Assessment is required for this project. It is legislative requirement under this Act that an application for environmental authorisation must be obtained before the construction of houses on identified land is developed. GA Environment (Pty) Ltd has thus been appointed by GladAfrica Consulting Engineers (Pty) Ltd to undertake a Basic Assessment for the proposed construction of affordable housing in Bryanston Extension 3. The National Environmental Management Act 107 of 1998, as amended (NEMA) and the Environmental Impact Assessment Regulations 2014 (as amended) requires that listed activities warrant an Environmental Authorisation (EA) from the competent authority. Since GDHS is an organ of state, the competent authority is the Department of Forestry, Fisheries and Environment (DFFE). Based on the triggered listed activities as indicated in the basic assessment report, a basic assessment process is required for the proposed housing development.

As part of the Basic Assessment (BA) process for the clearance of vegetation, an alien invasive management plan must be compiled to support the application. This document will provide the contractor, the developer, and the ECO with guidelines on how to effectively manage alien invasive species throughout the proposed development site. This plan must be implemented in conjunction with the approved EMPr as well as other management plans prepared for this proposed development. The exact details of the alien invasive management plan will depend on the extent of site, working area conditions, available manpower, and the desired environmental compliance state of the site as stipulated on the EA and EMPr.

1.1 Site location

The Bryanston Ext. 3B site is located approximately 30km north of the Johannesburg CBD and is located in Ward 104 within Region B, Sub-Region 20 of the City of Johannesburg Metropolitan Municipality where it borders Region E to the West. The co-ordinates of the approximate centre point of the site are 27°58'55.6"S and 26° 4' 4.6 "E. The site is located within the boundaries of the Ferndale Valley Arboretum and is surrounded by Spruce Street to the North, the broader Ferndale Valley Bird Sanctuary and Arboretum to the east and south and Cork Avenue to the west. The Ferndale Valley Arboretum falls under the management of the City of Johannesburg Parks. The proposed site is situated along Spruce Street and Cork Avenue and direct access is available from this street. The site is currently fenced by residents to conserve the area, especially the river-line bush to keep it free from vagrants, squatters, littering and general environmental degradation. Maintenance of the site is undertaken by the residents within the area. The 1:50 000 topographical map of the site and its locality is presented in **Figure 1**.

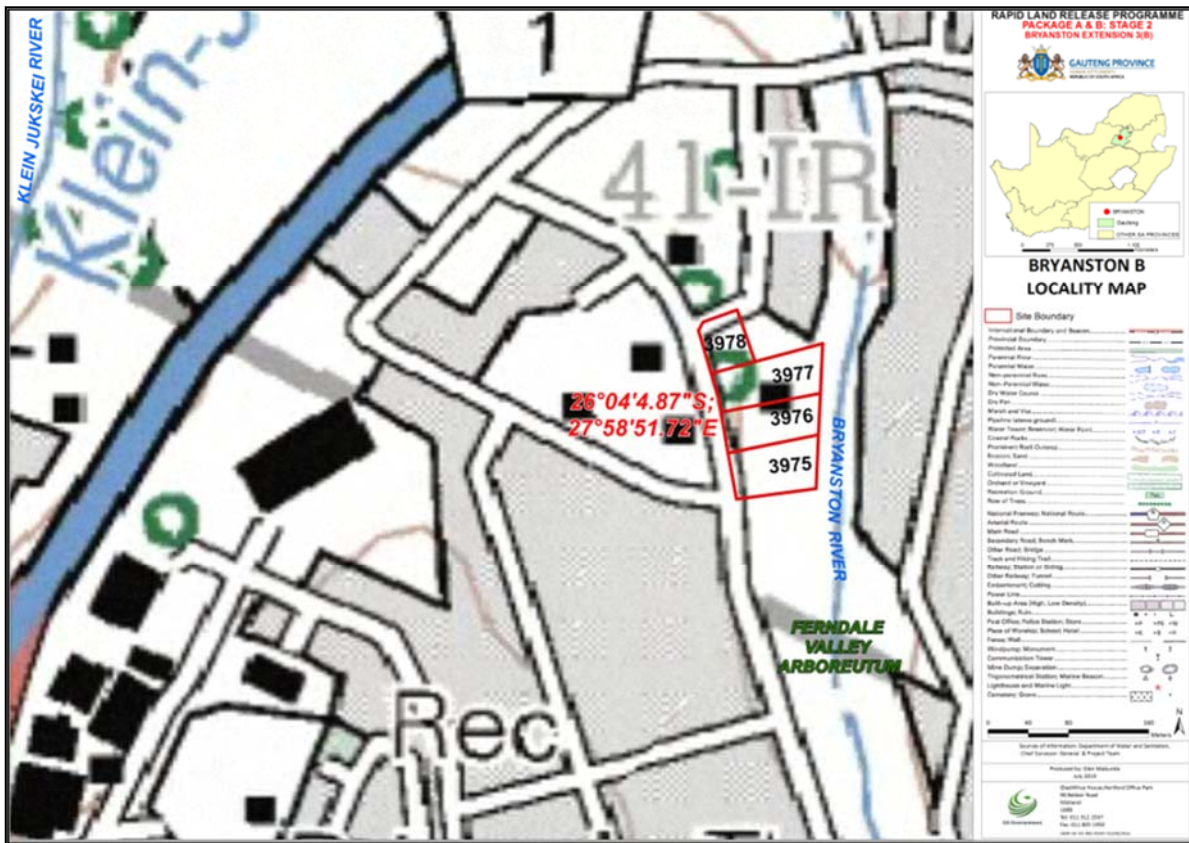


Figure 1: 1:50 000 topographical map of the site locality

The study area is located within the fenced boundaries of the Ferndale Valley Bird Sanctuary and Arboretum and is bordered in the east by the Bryanston River, a tributary of the Klein Jukskei River. The development is proposed on Erven 3975, 3976, 3977 and 3978 located in Extension 3 which are all under the ownership of the Gauteng Provincial Government (Refer to **Table 1**).

Table 1: Property Description

Property Description	Ownership	Title Deed Number	Extent (m ²)
Erf 3975 Bryanston Extension 3	Gauteng Provincial Government	T39723/2013	3 825
Erf 3976 Bryanston Extension 3	Gauteng Provincial Government	T39723/2013	3 509
Erf 3977 Bryanston Extension 3	Gauteng Provincial Government	T39723/2013	4 221
Erf 3978 Bryanston Extension 3	Gauteng Provincial Government	T39723/2013	2 062
Total			13 617

All the erven of the site are currently zoned “Residential 1” in terms of the City of Johannesburg Town Planning Scheme. The site is currently vacant and is surrounded predominantly by vacant land (which has also been earmarked for purposes of the Rapid Land Release Programme) and there are a few industrial and commercial uses in the surrounding area. It is the intention of GDHS to develop the vacant site into 184 walk up residential units constructed within the site boundary away from the sensitive environment as identified by the appointed Biodiversity Specialists.

1.2 Ecological setting

The environment within the study area is largely unaffected by human activities and remains natural with an intact vegetation structure and forms part of a larger contiguous open space area, defined by a watercourse and green belt, that is managed by both local authorities and the local residents association as a bird sanctuary. According to the Gauteng Development Guidelines for Ridges, the extent of the study area is located on a largely untransformed Class 4 ridge, with only a limited portion thereof in the north and west indicated as being transformed.

According to the information taken from various specialist reports undertaken during the Basic Assessment, the area falls within the Mesic Highveld Grassland Bioregion of the Grassland Biome and the Egoli Granite Grassland vegetation type, which is listed as an Endangered ecosystem (GN1002, 2011). However, all of this has been changed due to agricultural and urban developments. The majority of the study area (southern and central portions) is located in a Critical Biodiversity Area (CBA) and is regarded as an Important Area due to the primary vegetation and orange listed floral species habitat in the study area. The site is located within a Class 4 ridge per the 2019 as per the Gauteng Ridge Guideline and incorporates an Important Critical Biodiversity Area (CBA), largely designated as such in terms of potential floral features. This CBA is connected to a larger CBA associated with the Klein-Jukskei River north of site, via a CBA and Ecological Support Area (ESA) corridor. Please refer to **Figure 2** below.

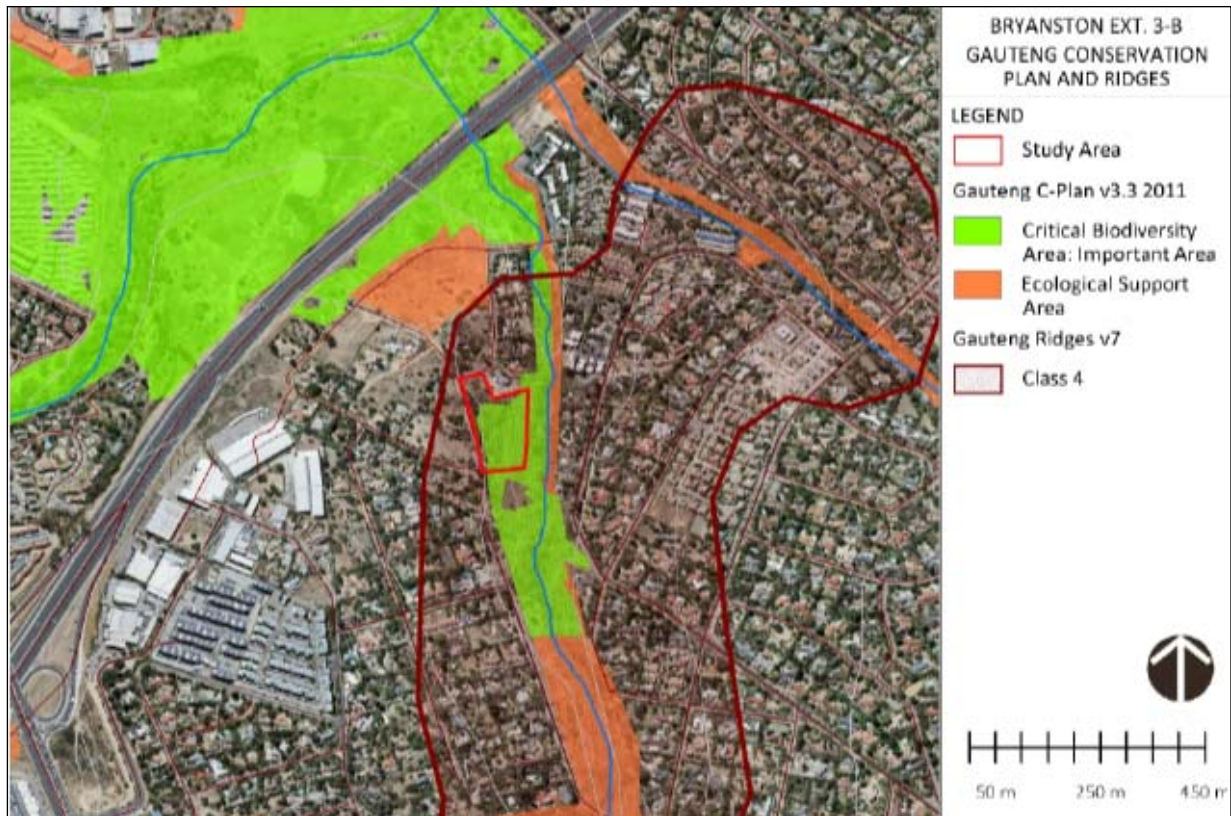


Figure 2: Conservation Plan within the vicinity of the study area as indicated by the Gauteng C-Plan (2011)

Four broad vegetation units that includes the Rocky grassland, bouldered rocky outcrop, indigenous woody vegetation and modified grassland were identified by the floral specialists. Modified vegetation unit were identified with the study site. The majority of the study area is characterised by natural rocky grassland vegetation, which mainly occurs within the eastern portion, refer to **Figure 3**. Development within these vegetation unit will impact on the current ecological condition.



Figure 3: An example of a rocky grassland vegetation within the site (Field and form, February 2020)

The rocky grassland vegetation unit provides habitat for a high diversity of indigenous grassland species and is considered to be largely representative of the Endangered (EN) Egoli Granite Grassland vegetation type. A high number of *Hypoxis hemerocallidea* occur throughout this habitat unit and were confirmed during the site assessment.

A prominent rocky outcrop comprising large boulders is located within the north western portion of the study area (**Figure 4**). This landscape feature provides habitat for several indigenous woody species, including species such as *Ficus ingens*, *Akocanthera oppositifolia* and *Vangueria infausta* which was not recorded elsewhere within the study area.



Figure 4. Examples of the Boulderated Rocky Outcrop vegetation unit within the north western portion of the study area.

Rocky habitat occurs along the streambanks, providing habitat for various *Cyperus spp.* and indigenous forb species, including the orchid species *Eulophia ovalis var. bainsii* and *Bonatea speciosa*, both of which are protected in terms of the TN. According to the Faunal Assessment report, the site supports a good variety of habitats, with the stream providing flowing water through a rocky area and also contained pools of quieter water. These large rocky koppie composed of large boulders. Soils were largely sandy loams which are utilised by several burrowing species with grainy, shallower sands around the rocky areas. The site and immediate surrounds therefore support a good variety of habitats and micro-habitats and, due to the heterogeneity in habitat and the connectivity between these habitats, fauna biodiversity is expected to be very good, considering the urban nature of the region.

The Woodland vegetation (**Figure 5**) occurred along the stream and also up-slope of the stream near the residential road and was noted to be composed of indigenous, exotic, and Alien invasive trees and provided tall and dense arboreal habitats. The main development footprint adjacent to the stream provided open grassland, interspersed with a variety of rocky habitats, largely bedrock and shallow rocky ridges. Termite mounds were prevalent within the grassy areas.



Figure 5: Example of land woodland vegetation unit noted on north western portion of the site

The site support limited Threatened or Protected mammals and avifaunal species. The Avifaunal specialist identified a list of 44 species during the site assessment. The most notable observation was of the African Finfoot at two locations along the river system. Small passerine species that are common to this area were also identified during the assessment. These species will obviously be disturbed and displaced during the construction. It is the recommendation of the Avifaunal specialist that greenbelts area such as the Arboretum be preserved as these are extremely important to the ecological health of any given region. These corridors according to the avifaunal specialist finding provide the necessary breeding, roosting and foraging resources to support a diversity and density of avifaunal species and the preservation of these areas is a must. **Figure 6** is a map showing the vegetation units within the study site to support the avifaunal and faunal habitats identified on site.

It can also be noted from **Figure 6** that the proposed Bryanston development footprint encroaches into the delineated riparian zone and wetland area and it was a recommendation of the Water resource assessment specialist that a buffer of 30 m be kept in order to ensure the conservation of watercourses.



Figure 6: Vegetation units identified within the vicinity of the study area

No tree species protected under the National Forest Act (Act No. 84 of 1998) or Threatened or Protected Species (TOPS) floral species as provided for in terms of the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEMBA) were encountered within the study area during the field assessment by the Flora Specialist. An enquiry to the Gauteng Department of Agriculture and Rural Development (GDARD) regarding the potential presence of nationally and provincially threatened and near threatened species, indicated that no such species are currently known to occur within the study area or within 5km thereof. Several threatened floral species are however known to occur within the larger 2627BB QDS. Details findings of the Floral Impact Assessment is attached as **Appendix G2**.

According to the information taken from the Floral Impact Assessment undertaken by the Field and Form (attached as **Appendix G2**), the proposed housing development will affect existing natural vegetation, watercourses and a sensitive ridge as tabulated in **Table 2** below.

Table 2: Desktop assessment of the floral ecological setting of the study area (Biodiversity Company, 2021)

Aspect	Conservation Characteristic
Biome	Grassland Biome
Bioregion	Mesic Highveld Grassland Bioregion.
Quarter Degree Square (QDS)	2627BB
Listed Threatened Ecosystem (2011)	Egoli Granite Grassland ecosystem (Endangered (EN))

Vegetation Type (2006, 2012)	Egoli Granite Grassland vegetation type (Critically Endangered (CR))
National Biodiversity Assessment (2018)	Remnant/ remaining extent of Egoli Granite Grassland (Critically Endangered (CR)). A channelled valley bottom wetland is indicted to be associated with the Bryanston River bordering the study area in the east.
Conservation Plan (Gauteng C-Plan v3.3)	The majority of the study area (southern and central portions) is located in a Critical Biodiversity Area (CBA): Important Area (primary vegetation and orange Listed floral species habitat).
Gauteng Ridges v7	The extent of the study area is located on a Class 4 ridge.
City of Johannesburg Open Spaces (City Parks)	Ferndale Valley Bird Sanctuary and Arboretum
Watercourses	Bryanston River

1.3 Definition of Alien Invasive Species

Alien invasive species are simply defined as plants, animals, pathogens and other organisms that are exotic, non-indigenous or non-native to an ecosystem, and which may cause economic or environmental harm or adversely affect human health. They spread aggressively, and which threaten indigenous ecosystem functioning and biodiversity, www.environment.com. Invaders and weed species are plants that invade natural or semi-natural habitats; especially areas disturbed by humans and are commonly known as environmental weeds. Weeds that invade severely disturbed areas are known as ruderal and agrestal weeds. Most of these weeds are annuals colonising waste sites and cultivated fields. These weeds only persist on recently disturbed areas and seldom invade established areas.

Alien and invasive floral species lead to degradation of the ecological integrity of an area, which in turn may lead to, amongst others, a decline in and potential local extinction in indigenous species diversity, an ecological imbalance and the decreased productivity of grazing land (Bromilow, 2010). According to Brimlow, alien invasive species tend to out-compete the indigenous vegetation; this is since they are vigorous growers that are adaptable and able to invade a wide range of ecological niches. Alien invasive floral species must be controlled in terms of the Alien and Invasive Species Regulations (2014).

1.4 Scope and Objectives of the alien and invasive plant management plan

The purpose of the Alien Invasive Management Plan (AIMP) is to implement avoidance and mitigation measures to reduce the impact of the proposed development site and on the sensitive biodiversity. This plan must be used and read in conjunction with the EMPr.

1.5 Details of Environmental Assessment Practitioner

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Ms. Nkhensani Khandlhela is currently the Environment and Sustainability Manager at GA Environment (Pty) Ltd. Nkhensani was promoted in September 2017 from the position of Principal Environmental Scientist to Environment and Sustainability Manager. This position reports to the GA Environment Executive and entails technical oversight and management of the Environment and Sustainability Division within the GladAfrica Group Environmental Business Unit. This also includes taking responsibility for the integration and coordination with the Health and Safety division to ensure seamless service delivery to clients on projects.

Nkhensani holds a Master of Science Degree (in Geography) from the University of KwaZulu Natal. She is an Environmental Scientist with 23 years of experience. She is registered as a Professional Natural Scientist (Environmental Scientist). Nkhensani has over the past 18 years specialised in Integrated Environmental Management (IEM), Scoping & Environmental Impact Assessments (EIAs), Waste licence and Environmental Authorisation applications. Nkhensani has undertaken and managed numerous projects in her fields of expertise for public sector, private sector and industry, and has developed a track record of professional excellence in the field. Nkhensani was involved in undertaking external environmental auditing in the two large Eskom Power Station projects (Ingula Pumped Storage Scheme and Kusile), Transnet (Construction of Third Tippler and Bulk Power Infrastructure in the Port of Saldanha), Rand Water, Joburg Water, etc. She is currently the Independent External Environmental Auditor for the construction of Phase 2 of the Lesotho Highland Water project.

1.6 Key role players and responsibility matrix

For the Alien and Invasive Management plan (AIMP) to be successfully implemented, all the role players involved in the project need to co-operate. For this, role players must clearly understand their roles and responsibilities, they must be professional and they must form respectful and transparent relationships and maintain open lines of communication. The key role players for the rehabilitation phase and the post rehabilitation monitoring phases are as follows:

- Developer;
- Engineer;
- Contractor; and
- Environmental Control Officer.

The functions and responsibilities of each of these role players are outlined in **Table 3**.

Table 3: Functions and responsibilities of the project team for the implementation of the Rehabilitation Plan

ROLE	PHASE INVOLVEMENT OF	RESPONSIBILITIES
Developer <i>GDHS</i>	Construction, Rehabilitation and Operational phases	<ul style="list-style-type: none"> • Appointing project team; and • Ensuring that the AIMP, is circulated to the project team. • Ensuring overall compliance with the rehabilitation plan
Consulting Engineer <i>GladAfrica Consulting Engineers</i>	Construction, Rehabilitation and Operational phases	<ul style="list-style-type: none"> • Ensuring that the Contractor undertakes all construction, operational and maintenance activities in line with the AIMP, • Ensuring that all non-compliances, environmental or otherwise are actioned by the Contractor.
Contractor <i>To be appointed</i>	Construction, Rehabilitation and Operational phases	<ul style="list-style-type: none"> • Implement the AIMP, • Addresses all areas of concern raised by the Consulting Engineer or Environmental Control Officer during construction, operational and maintenance
Environmental Control Officer <i>To be appointed</i>	Construction, Rehabilitation and Operational phases	<ul style="list-style-type: none"> • Ensuring that the Contractor undertakes all co activities in line with the AIMP • Undertaking of Environmental Audits and circulating reports to the project team

2 ALIEN INVANSIVE MANAGEMENT PLAN

The compilation of AIMP aims at managing and controlling potential aliens. This AIMP acts as a guideline to be applied by all contractors and other role players involved in the project. The AIMP is an evolving guideline that needs to be updated or adapted as progress is made in terms of the control of alien invasive species within the project area, and successes and failures of procedures identified.

As per the Floral Impact Assessment Report attached in **Appendix G2**, there are four broad vegetation units were identified within the study area namely; the Rocky Grassland (high floral sensitivity), Boulderded Rocky Outcrop (medium high floral sensitivity), Woodland (medium floral sensitivity) and modified grassland (low floral sensitivity). Overall cumulative impacts on floral species diversity as a result of the proposed project are considered to be moderate to high. Cumulative impacts may include the combined impact of various similar developments in the area and may include the cumulative loss of local floral species diversity within the larger region. The disturbance of large areas of natural vegetation in the region may contribute towards increased alien plant species proliferation, as well as bush encroachment into grassland areas. It is therefore of importance that the AIMP be compiled and implemented during the construction, operational and maintenance phase of the project. The objectives of the AIMP are thus:

- Actively aid the improvement of indigenous biodiversity within and around the site by removing all invasive alien plant species and;
- Improving the ecosystem function of natural landscapes and their associated vegetation.

The overall aim of this AIMP will be to control and manage alien and invasive plant species during the construction, operational and maintenance phases within the study area.

2.1 Applicable Legislation

The Conservation of Agriculture Resources Act No. 43 of 1983 (CARA) Regulations have been superseded by the National Environmental Management: Biodiversity Act, 2004 (Act no. 10 of 2004) – Alien and Invasive Species (AIS) Regulations which became law on 1 October 2014, www.arc.agric.za/arc-ppri/weed. These Regulations call on land owners and sellers of land to assist the Department of Environmental Affairs now Department of Forestry, Fisheries and Environment (DFFE) to conserve indigenous fauna and flora. Non-adherence to the Regulations by a land owner or seller of land, can result in a criminal offense

punishable by a fine of up to R5 million (in case of 2nd offence, R10 million) and / or a period of imprisonment of up to 10 years.

According to these regulations, alien species (birds, animals, insects and plants), are categorised as Invasive species; and Prohibited species. According to the classification of these species, certain invasive species must be controlled and eradicated, while others require a permit to be obtained. The only currently active legislation on weeds and invasive plants in South Africa forms part of the Conservation of Agricultural Resources Act, 1983 (Act No 43 of 1983) (CARA). Regulations 15 and 16 under this Act, which concern problem plants, were amended during March 2001. CARA is currently (2011) in the process of being revised. In brief, the following key legislation is thus applicable.

- National Environmental Management: Biodiversity Act (10/2004): Alien and Invasive Species Regulations, 2014
- Section 151(1) of the National Water Act 36 of 1998;
- Section 28 of the National Environmental Management Act, 107 of 1998;
- Section 31A of the Environment Conservation Act, 73 of 1989;
- Municipal by-laws and the National Veld and Forest Fire Act 101 of 1989; and
- The present legislation forms part of the Conservation of Agricultural Resources Act, 1983 (Act No 43 of 1983) (CARA). Regulations 15 and 16 under this Act, dealing with problem plants, were amended during March 2001

2.1 Principles to ensure effective management of alien invasive

Invasive alien plant species are difficult to control. Methods should be used that are appropriate for the species concerned, as well as to the ecosystem in which they occur. When performing the controlling methodology for weeds and invaders, damage to the environment must be limited to a minimum. The methodology must be performed for at least three growing seasons to ensure the seed bank is depleted. Continual monitoring will be needed for seeds that are likely to be blown in from adjacent areas. The clearing of vegetation for the proposed housing development and associated infrastructure will leave bare patches of soil, thereby enhancing the colonisation by ruderal weeds (mostly annual weeds) or declared alien species that will prohibit the natural succession during rehabilitation activities. Such soil disturbances (as well as the inappropriate handling of topsoil) could enhance the establishment or spread of invasive adjacent to the development.

The following must be included when addressing invasive species in the area:

- Alien control programs are long-term management interventions and should include a clearing plan which includes follow up actions for rehabilitation of the cleared area.
- Alien problems at the site should be identified during preconstruction surveys (should there be indications) of the development footprint.
- The clearing plan should then form part of the preconstruction reporting requirements for the site.
- The plan should include a map showing the alien density also indicating potential alien species in each area.
- Lighter infested areas should be cleared first to prevent the build-up of seed banks.
- Collective management and planning with neighbouring landowners may be required as seeds of alien invasive species are easily dispersed across boundaries by wind and the movement of people and livestock.
- All clearing actions should be monitored and documented to keep track of which areas are due for follow-up clearing.
- Chemical mechanism of alien invasive plant control should be avoided unless necessary.
- Alien and invasive plant species must be cleared on site and re-vegetated by planting indigenous vegetation.
- The mitigations highlighted in the Rehabilitation report must be considered in instances where applicable.

2.2 Declared Weeds and Invader Plants Categories

Declared weeds and invaders have the tendency to dominate or replace the canopy or herbaceous layer of natural ecosystems, thereby transforming the structure, composition and function of natural ecosystems. The National Environmental Management: Biodiversity Act, 2004 (Act no. 10 of 2004) – Alien and Invasive Species (AIS) Regulations lists about 383 invasive plant species into four categories that must be managed, controlled or eradicated from areas where they may cause harm to the indigenous environment. These four categories of problem plants are as follows:

- **Category 1** plants may not occur on any land other than a biological control reserve and must be controlled or eradicated. Therefore, no person shall establish, plant, maintain, propagate or

sell/import any category 1 plant species. These plants may no longer be planted or propagated, and all trade in these species is prohibited.

- **Category 1B** - Invasive species which must be controlled and wherever possible, removed and destroyed. Any form of trade or planting is strictly prohibited.
- **Category 2** plants are plants with commercial application and may only be cultivated in demarcated areas (such as biological control reserves) otherwise they must be controlled. These plants pose a threat to the environment but nevertheless have commercial value. These species are only allowed to occur in demarcated areas and a land user must obtain a water use license as these plants consume large quantities of water.
- **Category 3** plants are ornamentally used plants and may no longer be planted, except those species already in existence at the time of the commencement of the regulations (30 March 2001), unless they occur within 30 m of a 1:50 year floodline and must be prevented from spreading. These plants have the potential of becoming invasive but are considered to have ornamental value. Existing plants do not have to be removed but no new plantings may occur, and the plants may not be sold.

Based on the findings of the Floral Impact Assessment, Fourteen (14) Category 1b, one (1) Category 2 and one (1) Category 3 invasive plant species were recorded within the project area. A list of Alien Invasive Species recorded within the study area as provided in **Appendix B** of this report.

In general, invasive alien plant control relies on four main methods - *manual*, *mechanical*, *chemical* and *biological* control. Long-term success of any programme is best achieved through a combination of these. This is called an integrated control approach. For the purpose of this report, a three-phase control programme presented in a section that follow must be considered in order to manage the alien invasive.

2.2.1 Alien invasive management plan (*Three-phased Control Programme*)

As mentioned, different species require different clearing methods such as manual, chemical or biological methods or in combination. During construction, mechanical methods should be encouraged as the main form of control, together with the judicious use of herbicides. The preferred clearing methods for most alien species can be obtained from the DWS Working for Water Website <http://www.dwaf.gov.za/wfw/>. For any alien eradication programme to be successful, a three-phased control approach that should be followed and is briefly presented as follows:

- **Initial control** - Initial control requires an “aggressive” remedial approach with the aim to drastically reduce the number of alien invader vegetation to acceptable and manageable levels.
- **Follow-up control** - Follow-up control is vital to control any re-growth or new seedlings. Follow-up control methods may occur as soon as re-growth or seedlings are and
- **Maintenance control** – this approach involves the continual monitoring of the alien vegetation on a regular (preferably bi-monthly) basis to identify any re-growth or seedlings. It is expected that the infestation densities will have been reduced dramatically by this stage and that only individual specimens may appear from time to time. It is preferred that any alien re-growth be removed manually to exclude the unnecessary use of chemicals

Such a three-phased control programme may consider the use of a combination of chemical and mechanical control options. Chemical control of alien plants is not recommended especially as the site is located within a protected environment. Chemicals control must be considered as the last option and if required should only be applied by qualified personnel. It is usually preferable to use manual clearing methods where possible, although such methods may create additional disturbance which may stimulates alien invasion and may also be ineffective for many woody alien invasive species. Should herbicides be considered, all care must be taken to prevent contamination of any water bodies. Where herbicides are to be used, the impact of the operation on the natural environment should be minimised by implementing some of the following measures:

- Equipment should be washed where there is no danger of contaminating water sources and washings carefully disposed.
- To avoid damage to indigenous or other desirable vegetation, products should be selected that will have the least effect on non-target vegetation.
- Coarse droplet nozzles should be fitted to avoid drift onto neighboring vegetation.
- No spraying of herbicides should take place in windy conditions or during wet conditions.
- The appropriate health and safety procedures should also be followed regarding the storage, handling and disposal of herbicides.
- For all herbicide applications, the following guidelines should be followed: Working for Water: Policy on the Use of Herbicides for the Control of Alien Vegetation <http://www.dwaf.gov.za/wfw>
- Only herbicide registered for use on target species may be used. It is a high priority of any eradication programme that makes use of herbicides or power equipment to implement the correct safety procedures and to prevent chemical spillages. Strictly follow the specified treatment concentrations

for the relevant herbicides as specified by the product label. Always ensure that all staff members are properly trained and make them wear protective clothing when working with herbicides or other equipment (e.g. handsaws).

Regarding manual labour, hand pulling is most effective with small (30 cm), immature or shallow rooted plants. This method is mostly preferred especially in sensitive areas. Mitigation to ensure maintain environmental standards that may be considered include the following:

- It is important that records in the form of site photographs be kept for all steps that are during the removal and management of aliens, should these be required by the Competent Authority during close out.
- Once the vegetation clearance and soil preparation processes commence, conduct weekly walkthrough of the proposed development area as well as a minimum 50 m perimeter around the area, in order to identify all seedlings of any alien invasive species which might start to germinate and establish.
- Physically remove all identified alien invasive species seedlings from the soil by manually pulling them out with as much as possible of their root systems still intact.
- Place all removed alien invasive species seedlings in a metal drum or any other suitable containing unit and close the drum/containing unit in order to isolate the seedlings.
- Place the closed drum/containing unit on a concrete slab or any other suitable impermeable surface in direct sunlight in order to isolate the alien invasive species seedlings from any natural vegetation and prevent spreading of materials.
- Leave the closed drum/containing unit in direct sunlight for a minimum period of one week in order for all alien invasive species seedlings and materials to adequately dry out and die.
- Once all alien invasive species seedlings and materials have adequately dried out and died, remove the material from the drum/containing unit and place the materials in a minimum 1 m deep hole which is isolated from any natural vegetation for disposal at nearby registered, landfill site.

2.2.2 Integrated Alien species Control Strategies

An integrated control strategy uses a combination of control options for a number of species during a particular situation. This approach is based on ranking the study site into priority areas for control. Therefore, high priority areas should be controlled first. As a general rule, maintenance control should

consider areas with low infestations first and then move to areas of higher infestation since control of these areas will be rapid and cost-effective. Also, the direction of control should be in a downstream direction, meaning that initial control should start upstream and terminate downstream. In addition, control measures should aim to remove alien infestation from the edge of a grove or patch to prevent any further spread.

2.3.2.1 Control Zones

It is known that clearing of vegetation in preparation for construction that will leave bare patches of soil, thereby enhancing the colonisation by alien species that will prohibit the natural succession during rehabilitation activities. Such soil disturbances (as well as the inappropriate handling of topsoil) could enhance the establishment or spread of *alien species* to natural systems adjacent of the development. At least two working days and at least one group is required to control alien vegetation identified from the control zone as this is a footprint development and limited to the specified location.

The control team members will be responsible for applying foliar spray. When appointing this method, certain precautions such using it on rain free days or dew falls must be observed. Spraying in windy weather must be avoided as the spray may encounter non-target plants.

As the project is a footprint development and is approximately 1.36 hectares, it is anticipated that initial control will take shorter hours to complete compared to linear development. Follow-up control should commence two weeks after initial control was completed and anticipated to be completed within a day. However, in the event of very little re-growth, follow-up control should be postponed for at least another month. Should re-growth be vigorous, a second follow-up treatment may be necessary.

The following management actions are aimed at reducing soil disturbance during the construction phase of the development, as well as reducing the likelihood that alien species will be brought onto site or otherwise encouraged.

2.3 Monitoring and Auditing

The re-emergence of aliens can simply be monitored as part of the internal and external auditing requirements that may come as a condition in the Environmental Authorisation. Monitoring of alien invasives can simply be undertaken as follows:

- Undertaking follow-up inspections are required in order to establish whether follow-up operations

are required.

- It is preferable to follow up on an area and remove all seedlings or treat resprouting plants, rather than treat a new area.
- Post rehabilitation monitoring plan is used to ensure that critical aspects of rehabilitation are monitored.

Table 4: Specifications for monitoring (Construction and Post Monitoring)

Environmental Aspect	Description	Frequency and record keeping method
Planning Phase		
Alien removal plan	The Contractor must submit a plan 45 days before site establishment for review by GladAfrica Consulting Engineers and ECO if required.	<ul style="list-style-type: none"> • Once off, 45 days before site establishment • ECO and Contractors 's Environmental file
Alien removal plan approval	ECO must approve Alien removal plan before site establishment.	<ul style="list-style-type: none"> • Once off, before site establishment
Site control	The construction must remain demarcated with appropriate fencing or hazard tape. These areas are no-go areas (this must be explained to all staff) that must be excluded from all development activities.	<ul style="list-style-type: none"> • Daily, as and when necessary • Bi weekly inspection for the first 2-3 weeks after establishment of vegetation
	Alien vegetation regrowth must be controlled throughout the entire site during the construction period.	<ul style="list-style-type: none"> • Daily, as and when necessary
Approval of clearance	The ECO is to approve all vegetation clearance prior to clearing commencing for the proposed development	<ul style="list-style-type: none"> • Daily, as and when necessary • Weekly inspection for the first 2-3 weeks after establishment of vegetation
Management of vegetation clearance	Only vegetation within the development footprint may be cleared and must take place as construction progresses on site. Mass clearing is not allowed unless the entire cleared area is to be rehabilitated immediately.	<ul style="list-style-type: none"> • Weekly inspection for the first 2-3 weeks after establishment of vegetation • Photographic record
Herbicide Management	Cleared areas that have become invaded with alien invasive species can be sprayed with appropriate herbicides provided that these are such that they break down on contact with the soil. Residual herbicides should not be used. Such must be undertaken by a qualified specialist Pesticides may not be used. Herbicides may be used to control listed alien weeds and invaders only.	<ul style="list-style-type: none"> • Weekly inspection for the first 2-3 weeks after establishment of vegetation • Photographic record

Environmental Aspect	Description	Frequency and record keeping method
Management and Control Alien vegetation	Surveys for alien species should be conducted weekly until end of construction. All aliens identified should be removed from site.	<ul style="list-style-type: none"> • Weekly inspection for the first 2-3 weeks after establishment of vegetation • Photographic record
	Care must be taken to avoid the introduction of alien plant species to the site and surrounding areas. (Particular attention must be paid to imported material such as building sand or dirty earth-moving equipment.) Stockpiles should be checked regularly and any weeds emerging from material stockpiles should be removed.	<ul style="list-style-type: none"> • Weekly inspection for the first 2-3 weeks after establishment of vegetation • Photographic record
	Clearing activities must be contained within the affected zones and may not spill over into demarcated No Go areas.	<ul style="list-style-type: none"> • Weekly inspection for the first 2-3 weeks after establishment of vegetation • Photographic record
Access control	Alien vegetation regrowth must be controlled throughout the entire site during the construction period	<ul style="list-style-type: none"> • Weekly inspection for the first 2-3 weeks after establishment of vegetation • Photographic record
Post Construction (Rehabilitation)		
Rehabilitation	Revegetation with indigenous, locally occurring species should take place in areas where natural vegetation is slow to recover or where repeated invasion has taken place	<ul style="list-style-type: none"> • Once off, post construction
	No alien species should be cultivated onsite. If vegetation is required for aesthetic purposes, then non-invasive, water-wise locally occurring species should be used.	
	Cleared sites will thus have to be constantly monitored, and as soon as a seedling can be identified as alien invasive species, these must be pulled out by hand.	<ul style="list-style-type: none"> • Monthly, post construction

3 CONCLUSIONS AND RECOMMENDATIONS

Any land management programme in South Africa will inevitably include an alien plant control program. Alien control programs are essential to protect valuable resources such as biodiversity and the beautiful landscapes of our country. An alien control program however requires a high level of commitment, coordination between landowners and authorities, professional planning and implementation and a good dose of common sense. Competent land managers are essential for cost effective and professional implementation programmes. The guidelines provided are compiled from a wide source and will hopefully provide insight to land managers in order for financial and human resources to be effectively used in an integrated control programme.

4 REFERENCES

- 1) Bromilow C. (2010) Problem Plants and Alien Weeds of South Africa, Briza Publications.
- 2) Department of Water and Sanitation, Working for Water. <http://www.dwaf.gov.za/wfw> (Accessed 8 June 2021).
- 3) Gauteng Department of Agriculture and Rural Development (GDARD) (2011). Gauteng Conservation Plan Version 3.3 (C-Plan 3.3). Technical Report, October 2011.
- 4) Kevin Erwin Consulting Ecologist Inc. www.environment.com (Accessed 8 June 2021).
- 5) Field and Form. 2020. Floral Impact Assessment for the Proposed Bryanston 3B Housing Development to Support the Basic Assessment and Water Use Licence Application Process, Bryanston, Gauteng Province.

APPENDIX A: DESCRIPTION OF VEGETATION TYPES

Egoli Granite Grassland

VT 61 Bankenveld (100%) (Acocks 1953). LR 34 Rocky Highveld Grassland (100%) (Low & Rebelo 1996).

Distribution Gauteng Province: Johannesburg Dome extending in the region between northern Johannesburg in the south, and from near Lanseria Airport and Centurion (south of Pretoria) to the north, westwards to about Muldersdrif and eastwards to Tembisa. Altitude 1 280–1 660 m.

Vegetation & Landscape Features Moderately undulating plains and low hills supporting tall, usually *Hyparrhenia hirta*-dominated grassland, with some woody species on rocky outcrops or rock sheets. The rocky habitats show a high diversity of woody species, which occur in the form of scattered shrub groups or solitary small trees.

Geology & Soils Archaean granite and gneiss of the Halfway House Granite at the core of the Johannesburg Dome supporting leached, shallow, coarsely grained, sandy soil poor in nutrients of Glenrosa form. Small area is built by ultramafics. Dominant land types Bb and Ba.

Climate Strongly seasonal summer-rainfall region, with very dry winters. MAP 620–800 mm (overall average 680 mm). The coefficient of variation in MAP from 24–27% across the unit. Incidence of frost frequent, but higher in the south than the north. See also climate diagram for Gm 10 Egoli Granite Grassland (Figure 8.36).

Important Taxa Graminoids: *Aristida canescens* (d), *A. congesta* (d), *Cynodon dactylon* (d), *Digitaria monodactyla* (d), *Eragrostis capensis* (d), *E. chloromelas* (d), *E. curvula* (d), *E. racemosa* (d), *Heteropogon contortus* (d), *Hyparrhenia hirta* (d), *Melinis repens* subsp. *repens* (d), *Monocymbium ceresiiforme* (d), *Setaria sphacelata* (d), *Themeda triandra* (d), *Tristachya leucothrix* (d), *Andropogon eucomus*, *Aristida aequiglumis*, *A. diffusa*, *A. scabrivalvis* subsp. *borumensis*, *Bewsia biflora*, *Brachiaria serrata*, *Bulbostylis burchellii*, *Cymbopogon caesius*, *Digitaria tricholaenoides*, *Diheteropogon amplexans*, *Eragrostis gummiflua*, *E. sclerantha*, *Panicum natalense*, *Schizachyrium sanguineum*, *Setaria nigrirostris*, *Tristachya rehmannii*, *Urelytrum agropyroides*. Herbs: *Acalypha angustata*, *A. peduncularis*, *Becium obovatum*, *Berkheya insignis*, *Crabbea hirsuta*, *Cyanotis speciosa*, *Dicoma anomala*, *Helichrysum rugulosum*, *Justicia anagalloides*, *Kohautia amatymbica*, *Nidorella hottentotica*, *Pentanisia prunelloides* subsp. *latifolia*, *Pseudognaphalium luteo-album*, *Senecio venosus*. Geophytic Herbs: *Cheilanthes deltoidea*, *C. hirta*. Small Tree: *Vangueria infausta*. Tall Shrub: *Rhus pyroides*. Low Shrubs: *Anthospermum hispidulum*, *A. rigidum* subsp. *pumilum*, *Gnidia capitata*, *Helichrysum kraussii*, *Ziziphus zeyheriana*. Succulent Shrub: *Lopholaena coriifolia*.

Conservation Endangered. Target 24%. Only about 3% of this unit is conserved in statutory reserves (Diepsloot and Melville Koppies Nature Reserves) and a number of private conservation areas including Motsetse and Isaac Stegmann Nature Reserves, Kingskloof Natural Heritage Site, Melrose and Beaulieu Bird Sanctuaries as well as the Walter Sisulu National Botanical Garden. More than two thirds of the unit has already undergone transformation mostly by urbanisation, cultivation or by building of roads. Current

rates of transformation threaten most of the remaining unconserved areas. There is no serious alien infestation in this unit, although species such as *Eucalyptus grandis*, *E. camaldulensis* and *E. sideroxylon* are commonly found. Erosion is moderate and very low.

Remark 1 This grassland is considered by some to be primary, though is heavily utilised, poor in species and degraded, and often resembles secondary grassland that developed on old fields.

Remark 2 So-called Witwatersrand serpentine sourveld (Reddy et al. 2001)—rocky grasslands on ultramafic rocks of a greenstone belt of uncertain origin—falls within this vegetation unit. Unlike in the Barberton region (see SVI 13 Barberton Serpentine Sourveld), the floristic composition of the Witwatersrand serpentines does not support separation of the ultramafic sourveld as a separate unit. So far no endemic taxa have been discovered on the Witwatersrand serpentines, the floristic composition of which is similar to that of the surrounding granite grassland.

References Acocks (1953, 1988), Grobler (2000), Ellery et al. (2001), Reddy et al. (2001).

APPENDIX B: ALIEN SPECIES ENCOUNTERED WITHIN THE STUDY AREA

Table 5: Alien Invasive Species Encountered Within the Study Area (Field and Form, 2020)

Species	Common Name	Alien Category
Category 1b		
<i>Campuloclinium macrocephalum</i>	Pompom weed	Category 1
<i>Cereus jamacaru</i>	Queen of the night	Category 1
<i>Cotoneaster franchetii</i>	Cotoneaster	Category 3
<i>Crotalaria agatiflora</i>	Canarybird bush	Category X3
<i>Datura stramonium</i>	Common thorn apple	Category 1
<i>Ipomoea purpurea</i>	Common	Category 3
<i>Lantana camara</i>	Lantana	Category 1
<i>Melia azedarach</i>	Seringa	Category 3
<i>Mirabilis jalapa</i>	Four o'clock	Category 1
<i>Opuntia ficus-indica</i>	Sweet prickly pear	Category 1
<i>Salvia tiliifolia</i>	Linderlef sage	Not listed
<i>Solanum mauritanium</i>	Bugweed	Category 1
<i>Solanum sysimbriifolium</i>	Dense-thorned bitter apple	Category 1
<i>Tipuana tipu</i>	Tipu tree	Category 1
Category 2		
<i>Morus alba</i>	White mulberry	Category 3
Category 3		
<i>Ligustrum lucidum</i>	Chinese wax-leafed privet	Category 3
Not Listed		
<i>Bidens pilosa</i>	Common blackjack	Not listed
<i>Euphorbia inaequilatera</i>	Smooth prostrate euphorbia	Not listed
<i>Heliotropium amplexicaule</i>	Blue heliotrope	Not listed
<i>Iris sp.</i>	Iris	Not listed
<i>Myosotis sylvatica</i>	Wood forget-me-not	Not listed
<i>Pennisetum clandestinum</i>	Kikuyu	Not listed
<i>Richardia brasiliensis</i>	Mexican clover	Not listed
<i>Salvia coccinea</i>	Scarlet sage	Not listed
<i>Tagetes minuta</i>	Khakiweed	Not listed
<i>Tradescantia pallida</i>	Purple heart	Not listed
<i>Verbena aristigera</i>	Fine-leaved verbena	Not listed
<i>Zinnia peruviana</i>	Peruvian zinnia	Not listed

Category 1a – Invasive species that require compulsory control.

Category 1b – Invasive species that require control by means of an invasive species management programme.

Category 2 – Commercially used plants that may be grown in demarcated areas, provided that there is a permit and that steps are taken to prevent their spread.

Category 3 – Ornamentally used plants that may no longer be planted. Existing plants may remain, except within the flood line of watercourses and wetlands, as long as all reasonable steps are taken to prevent their spread.

X – proposed CARA category.