

**IKHWEZI BLOCK 1 HOUSING DEVELOPMENT, POTSDAM, BUFFALO CITY
METROPOLITAN MUNICIPALITY**

ECOLOGICAL IMPACT ASSESSMENT

DEDEAT REF: EC/13/A/LN1, LN2, LN3/M/16-04

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REVISIONS TRACKING TABLE**EOH Coastal and Environmental Services****Report Title:** Ikhwezi Block 1 Housing Development Ecological Impact Assessment**Report Version:** Draft**Project Number:** P40700021

Name	Responsibility	Signature	Date
Peter De Lacy	Ecological Specialist		June 2017
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INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

In terms of Appendix 6 of the Environmental Impact Assessment Regulations (G. NR. 982) as regulated by the National Environmental Management Act (Act no. 107 of 1998 and amended in 2014; NEMA), a Specialist Report must contain all the information necessary for a proper understanding of the nature of issues identified, and must include–

1. (1) A specialist report prepared in terms of the NEMA 2017 Regulations must contain-
 - (a) details of-
 - (i) the specialist who prepared the report; and
 - (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;
 - (b) a declaration that the specialist is independent in a form as may be specified by the competent authority;
 - (c) an indication of the scope of, and the purpose for which, the report was prepared;
 - (cA) an indication of the quality and age of base data used for the specialist report;
 - (cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;
 - (d) the date, duration and season of the site investigation and the relevance of the season to the outcome of the assessment;
 - (e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;
 - (f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;
 - (g) an identification of any areas to be avoided, including buffers;
 - (h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;
 - (i) a description of any assumptions made and any uncertainties or gaps in knowledge;
 - (j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;
 - (k) any mitigation measures for inclusion in the EMPr;
 - (l) any conditions for inclusion in the environmental authorisation;
 - (m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;
 - (n) a reasoned opinion-
 - (i) whether the proposed activity, activities or portions thereof should be authorised;
 - (iA) regarding the acceptability of the proposed activity or activities; and
 - (ii) if the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;
 - (o) a description of any consultation process that was undertaken during the course of preparing the specialist report;
 - (p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and
 - (q) any other information requested by the competent authority.

- (2) Where a government notice *gazetted* by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply

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1 THE PROJECT TEAM

In terms of Appendix 6 of the EIA Regulations (2017) a specialist report must contain-

- (a) details of-
 - (iii) the specialist who prepared the report; and
 - (iv) the expertise of that specialist to compile a specialist report including a curriculum vitae;
- (b) a declaration that the specialist is independent in a form as may be specified by the competent authority;

1.1 Details of specialist

Mr Peter De Lacy M.Sc

(Ecological Specialist)

Peter is an environmental consultant. He holds a BSc with majors in Environmental Science and Zoology, as well as a BSc (Hons) in Environmental Science both from Rhodes University. Peter's honours dissertation looked at the growth rate of indigenous street and garden trees and it has subsequently been published in the South African Journal of Botany. His MSc (Environmental Science) thesis was done through Rhodes University and is currently being examined. It looked at the woody species composition and congruent appreciation of the cultural and spiritual services provided by sacred areas in Grahamstown. He has an academic background in a range of fields including Urban Ecology and Forestry, Rehabilitation and Disturbance Ecology, Statistics, Environmental Impact Assessment, and Community-Based Natural Resource Management.

Mr Roy de Kock

(Report reviewer)

Roy is a Senior Consultant holding a BSc Honours in Geology and an MSc in Botany from the Nelson Mandela Metropolitan University in Port Elizabeth. His MSc thesis focused on Rehabilitation Ecology using an open-cast mine as a case study. He has been working for CES since 2010, and is based at the East London branch where he focuses on Ecological and Agricultural Assessments, Geological and Geotechnical analysis, Environmental Management Plans, mining applications and various environmental impact studies. Roy has worked on numerous projects in South Africa, Mozambique and Malawi.

1.2 Expertise

Projects Peter and Roy have worked on include:

Name of project	Description of responsibility	Date completed
Department of Rural Development and Agrarian Reform Lambasi Feedlot	Ecological Impact Assessment	September 2016
Element Debe Water Supply Scheme Phase 2 EIA (EC)	Ecological Impact Assessment	March 2016
BCMM Haven Hills Cemetery EIA (EC)	Ecological Impact Assessment	March 2016
InnoWind Riverbank Wind Energy Facility Ground truthing and permitting (EC)	Wetland Impact Assessment	February 2016
Mbhashe Local Municipality Road Upgrade (EC)	Ecological Impact Assessment and Wetland Impact Assessment	June 2015
GIBB SANRAL N2 Green River to Zwelitsha Road Upgrade (EC)	Ecological Impact Assessment	November 2015
GIBB SANRAL N2 Bypass (EC)	Ecological Impact Assessment	February 2016
Expansion of the Mkhambathi Forest Plantation (EC)	Aquatic Impact Assessment	April 2016

1.3 Declaration

- I, Peter De Lacy, declare that, in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014;
- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this report are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

2 INTRODUCTION

In terms of Appendix 6 of the EIA Regulations (2017) a specialist report must contain-

- (c) an indication of the scope of, and the purpose for which, the report was prepared;
- (d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;
- (e) a description of the methodology adopted in preparing the report or carrying out the specialised process;
- (i) a description of any assumptions made and any uncertainties or gaps in knowledge;
- (o) a description of any consultation process that was undertaken during the course of preparing the specialist report;
- (p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and
- (q) any other information requested by the competent authority.

2.1 Project description and location

Buffalo City Metropolitan Municipality (BCMM) is proposing to construct a housing development in the Potsdam area outside of East London. The town planning for the proposed low income housing development has been undertaken and the layout includes the development of 689 erven which includes:

- 669 housing units;
- A business facility;
- A community facility;
- A school;
- A crèche;
- Two churches;
- A municipal building;
- Public open spaces; and
- Internal roads.

Bulk services, such as sewerage, water reticulation, electricity, stormwater infrastructure and roads, will also form part of the development.

Figure 2.1 below shows the proposed layout of the housing development.

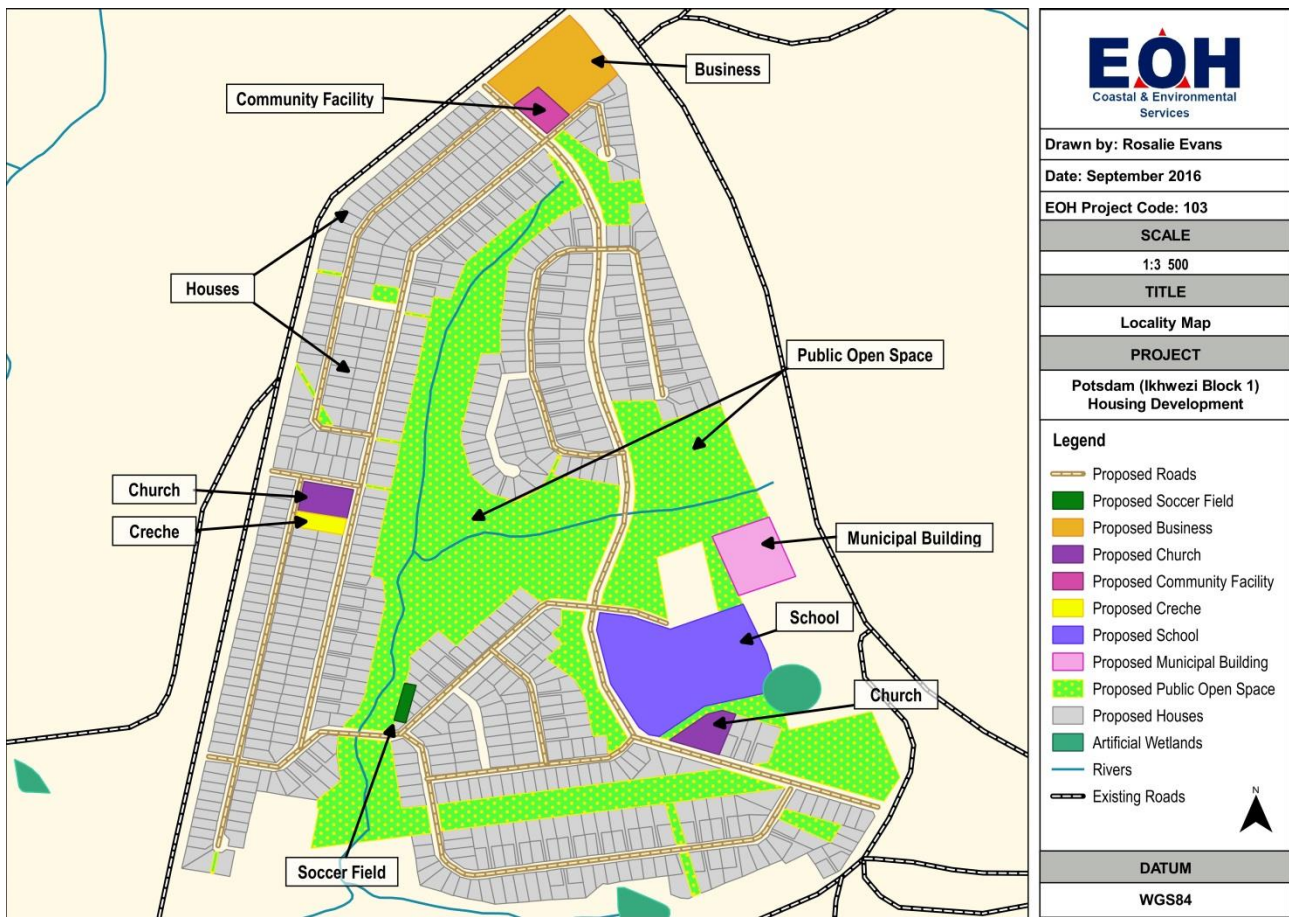


Figure 2.1: The proposed layout of the Ikhwezi Block 1 housing development

2.2 Terms of Reference

The Terms of Reference (ToR) for the Ecological Impact Assessment are provided below.

A detailed survey of the site will be undertaken to determine the possibility of there being listed threatened or protected ecosystems and species on the proposed project site. If any of these are found, the Environmental Management Programme (EMPr) will include recommended measures to remove or otherwise protect plant species found on the site that are afforded protection under the National Environmental Management: Biodiversity Act (no. 10 of 2004; NEMBA), during construction.

The ToR for an Ecological Impact Assessment includes:

1. Record the plant species that occur within the study area, based on field surveys;
2. Identify, and locate where possible, any plant Species of Conservation Concern (SCC), namely Threatened, Near Threatened, Rare (species with conservation status or which are) and endemic species (to the area);
3. All SCC's will be discussed in detail;
4. Provide a general description of the status of the water resources of the area according to published literature.
5. Provide a general description of the natural aquatic environment in the vicinity of the proposed new bridge structures.
6. Identify potential impacts of the proposed construction on the aquatic environment.
7. Provide a sensitivity map of the study areas in order for the proponent to better place the layout of the project's infrastructure;
8. Once a sensitivity map has been created, the consultant must suggest ecological corridors around or adjacent to the suggested project area, especially through sensitive sites or vegetation;

9. Identify and assess the environmental significance of the identified botanical impacts using the methodology prescribed by EOH, as this methodology is compliant with international best practice in EIA; and
10. Provide practical and realistic recommendations to mitigate the identified ecological impacts.

2.3 Methodology

The aim of this assessment is to identify areas of ecological importance and to evaluate these in terms of their conservation importance. In order to do so, the ecological sensitivity of the area is assessed as well as an identification of potential plant Species of Conservation Concern (SCC) that may occur in habitats present in the area.

To a large extent, the condition and sensitivity of the vegetation will also determine the presence of animal SCC and areas with high faunal biodiversity. It is for this reason that the assessment focuses on the vegetation aspects of the site, and includes only a small section on the fauna recorded and expected to live on the site.

It is not the aim of this study to produce a complete list of all animal and plant species occurring in the region, but rather to examine a representative sample. It is however, important to note that areas of high sensitivity as well as SCC have been identified as far as possible, either from records from the site or a review of their habitat requirements, and whether or not these habitats occur within the site. The aim of this study is to identify areas of high sensitivity and those that may be subject to significant impacts from the project. It is important to note that an aquatic impact assessment has been conducted and as such those areas of ecological importance will be included in the sensitivity section of this report. Aspects that would increase impact significance include:

- Presence of plant SCC.
- Presence of animal SCC.
- Vegetation types (which also constitute faunal habitats) of conservation concern.
- Areas of high biodiversity.
- The presence of process areas:
 - Ecological corridors
 - Complex topographical features (especially steep and rocky slopes that provide niche habitats for both plants and animals).

2.3.1 Species of conservation concern

Plant SCC

Data on the known distribution and conservation status for each potential plant SCC needs to be obtained in order to develop a list of SCC present on site. These plant species are those that may be impacted significantly by the proposed activity. In general these will be species that are already known to be threatened or at risk. Efforts to provide the conservation status ('red list' status) of individual species may provide additional valuable information on SCC (see <http://www.iucnredlist.org/>). Species that are afforded special protection, which are protected by CITES (Convention on International Trade in Endangered Species of Wild Flora and Fauna) are also regarded as SCC (see <http://www.cites.org/>).

Animal SCC

Animal SCC in terms of the project area is defined as:

Threatened species:

1. Animal species listed in the Endangered or Vulnerable categories in the revised South African Red Data Books (SA RDB – amphibians, du Preez and Carruthers, 2009; reptiles, Branch 1988; birds, SA Birding, 2008; terrestrial mammals, Apps, 2000); and/or
2. Species included in other international lists (e.g., 2010 International Union for Conservation of Nature (IUCN) Red List of Threatened Animals).

Definitions

The following definitions of the conservation status of plant and animal SCC are provided (Source: SANBI Red Data List):

- **Critically Endangered (CR)** - A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Section V of the Red Data List), and it is therefore considered to be facing an extremely high risk of extinction in the wild.
- **Endangered (EN)** - A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Section V of the Red Data List), and it is therefore considered to be facing a very high risk of extinction in the wild.
- **Vulnerable (VU)** - A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild.
- **Near Threatened (NT)** - A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.
- **Sensitive species** - Species not falling in the categories above but listed in:
 - Appendix 1 or 2 of the Convention of International Trade in Endangered Species (CITES).
- **Endemic species** - Species endemic to South Africa, and more specifically Eastern Cape.
- **Least concern (LC)** – A taxon is of Least Concern when it does not qualify for any of the other categories. Widespread and abundant taxa are typically listed in this category.

2.3.2 Sampling protocol

Vegetation

The entire site was observed to evaluate the vegetation of the study area and to add detailed information on the plant communities present. The site observation took into account the amount of time available for the study and limitations such as the seasonality of the vegetation.

Vegetation within the entire site was surveyed and vegetation communities were then described according to the dominant species recorded from each type. These were then mapped and assigned a sensitivity score.

Animals

The assessment of animals was based on a general observation of species noted onsite during the site assessment, but with particular consideration of potential animal SCC based on the onsite vegetation.

2.3.3 Vegetation mapping

Mucina and Rutherford developed the National Vegetation map in 2006 with an update in 2012 (Mucina and Rutherford 2012) as part of a South African National Biodiversity Institute (SANBI) funded project: “It was compiled in order to provide floristically based vegetation units of South Africa, Lesotho and Swaziland

at a greater level of detail than had been available before.” The map was developed using a wealth of data from several contributors and has allowed for the best national vegetation map to date, the last being that of ACOcks developed over 50 years ago. The SANBI Vegetation map informs finer scale bioregional plans such as in fall STEP. This SANBI Vegetation map project has two main aims:

- to determine the variation in and units of southern African vegetation based on the analysis and synthesis of data from vegetation studies throughout the region, and
- to compile a vegetation map. The aim of the map was to accurately reflect the distribution and variation on the vegetation and indicate the relationship of the vegetation with the environment. For this reason the collective expertise of vegetation scientists from universities and state departments were harnessed to make this project as comprehensive as possible.

The map and accompanying book describes each vegetation type in detail, along with the most important species including endemic species and those that are biogeographically important. This is the most comprehensive data for vegetation types in South Africa.

This is compared to actual conditions of vegetation observed onsite during the site assessment through mapping from aerial photographs, satellite images, literature descriptions (e.g. SANBI and ECBCP) and related data gathered on the ground.

2.3.4 Sensitivity assessment

This section of the report explains the approach to determining the ecological sensitivity of the study area on a broad scale. The approach identifies zones of high, moderate and low sensitivity according to a system developed by EOH and used in numerous ecological studies. It must be noted that the sensitivity zonings in this study are based solely on ecological characteristics and social and economic factors have not been taken into consideration. The sensitivity analysis described here is based on 10 criteria which are considered to be of importance in determining ecosystem and landscape sensitivity. The method predominantly involves identifying sensitive vegetation or habitat types, topography and land transformation (Table 2.1).

Although very simple, this method of analysis provides a good, yet conservative and precautionary assessment of the ecological sensitivity.

Table 2.1: Criteria used for the analysis of the sensitivity of the area.

CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
1	Topography	Level or even	Undulating; fairly steep slopes	Complex and uneven with steep slopes
2	Vegetation - Extent or habitat type in the region	Extensive	Restricted to a particular region / zone	Restricted to a specific locality / site
3	Conservation status of fauna / flora or habitats	Well conserved independent of conservation value	Not well conserved, moderate conservation value	Not conserved - has a high conservation value
4	Species of special concern - Presence and number	None, although occasional regional endemics	No endangered or vulnerable species, some indeterminate or rare endemics	One or more endangered and vulnerable species, or more than 2 endemics or rare species
5	Habitat fragmentation leading to loss of viable populations	Extensive areas of preferred habitat present elsewhere in region not susceptible to fragmentation	Reasonably extensive areas of preferred habitat elsewhere and habitat susceptible to fragmentation	Limited areas of this habitat, susceptible to fragmentation

CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
6	Biodiversity contribution	Low diversity or species richness	Moderate diversity, and moderately high species richness	High species diversity, complex plant and animal communities
7	Visual quality of the site or landscape from other vantage points	Site is hidden or barely visible from any vantage points with the exception in some cases from the sea	Site is visible from some or a few vantage points but is not obtrusive or very conspicuous	Site is visible from many or all angles or vantage points
8	Erosion potential or instability of the region	Very stable and an area not subjected to erosion	Some possibility of erosion or change due to episodic events	Large possibility of erosion, change to the site or destruction due to climatic or other factors
9	Rehabilitation potential of the area or region	Site is easily rehabilitated	There is some degree of difficulty in rehabilitation of the site	Site is difficult to rehabilitate due to the terrain, type of habitat or species required to reintroduce
10	Disturbance due to human habitation or other influences (alien invasive species)	Site is very disturbed or degraded	There is some degree of disturbance of the site	The site is hardly or very slightly impacted upon by human disturbance

A sensitivity map was drawn up with the aid of a satellite image so that the sensitive regions and vegetation types could be plotted. The following was also taken into account:

2.3.5 Biodiversity

ECBCP is a detailed, low-level conservation mapping tool for land-use planning purposes. The aim of ECBCP is to map critical biodiversity areas through a systematic conservation planning process. The current biodiversity plan includes the mapping of priority aquatic features, land-use pressures, critical biodiversity areas and develops guidelines for land and resource-use planning and decision-making.

The main outputs of the ECBCP are “critical biodiversity areas” (CBAs), which are allocated the following management categories:

CBA 1 = Maintain in a natural state

CBA 2 = Maintain in a near-natural state

Land use outputs not classified as CBAs are called Biodiversity Land Management Classes (BLMCs) and are allocated the following management categories.

BLMC 3 = Functional Landscapes

BLMC 4 = Towns & Settlements

BLMC 4 = Woodlots & Plantations

BLMC 4 = Cultivated Land

ECBCP maps the CBAs based on extensive biological data and input from key stakeholders. Although ECBCP is mapped at a finer scale than the National Spatial Biodiversity Assessment (Driver *et al.*, 2005) it is still, for the large part, inaccurate and “course”. Therefore it is imperative that the status of the environment, for any proposed development MUST first be verified before the management recommendations associated with the ECBCP are considered (Berliner and Desmet, 2007). It is also important to note that in absence of any other biodiversity plan, the ECBCP has been adopted by the Provincial Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) as a strategic biodiversity plan for the Eastern Cape.

2.3.6 Protected Areas

The purposes of identifying areas that are protected according to the National Environmental Management: Protected Areas (Act No. 57 of 2003; NEMPAA) are:

- To protect ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes in a system of protected area.
- To preserve the ecological integrity of these areas.
- To conserve biodiversity in these areas.
- To protect areas representative of all ecosystems, habitats and species naturally occurring in South Africa.
- To protect South Africa's threatened or rare species.
- To protect an area this is vulnerable or ecologically sensitive.
- To assist in ensuring the sustained supply of environmental goods and services.
- To provide for the sustainable use of natural or biological resources.
- To create or augment destinations for nature based tourism.
- To manage the inter-relationship between natural environment biodiversity, human settlement and economic development.
- Generally to contribute to human, social, cultural, spiritual and economic development.
- To rehabilitate and restore degraded ecosystems and promote the recovery of endangered and vulnerable species.

The goal of the National Protected Areas Expansion Strategy (NPAES) is to achieve cost-effective protected area expansion for ecological sustainability and increased resilience to climate change. It sets targets for protected area expansion, provides maps of the most important areas for protected area expansion, and makes recommendations on mechanisms for protected area expansion. The NPAES has classified protected areas into three categories: formally protected areas, informally protected areas and focus areas. Focus areas are large, intact and unfragmented areas suitable for the creation or expansion of large protected areas.

2.4 Impact assessment

2.4.1 Impact rating methodology

To ensure a direct comparison between various specialist studies, a standard rating scale has been defined and will be used to assess and quantify the identified impacts. This is necessary since impacts have a number of parameters that need to be assessed. Five factors need to be considered when assessing the significance of impacts, namely:

- Relationship of the impact to **temporal scales** - the temporal scale defines the significance of the impact at various time scales, as an indication of the duration of the impact.
- Relationship of the impact to **spatial scales** - the spatial scale defines the physical extent of the impact.

- The severity of the impact - the **severity/beneficial scale** is used in order to scientifically evaluate how severe negative impacts would be, or how beneficial positive impacts would be on a particular affected system (for ecological impacts) or a particular affected party.
- The severity of impacts can be evaluated with and without **mitigation** in order to demonstrate how serious the impact is when nothing is done about it. The word ‘mitigation’ means not just ‘compensation’, but also the ideas of containment and remedy. For beneficial impacts, optimization means anything that can enhance the benefits. However, mitigation or optimization must be practical, technically feasible and economically viable.
- The **likelihood** of the impact occurring - the likelihood of impacts taking place as a result of project actions differs between potential impacts. There is no doubt that some impacts would occur (e.g. loss of vegetation), but other impacts are not as likely to occur (e.g. vehicle accident), and may or may not result from the proposed development. Although some impacts may have a severe effect, the likelihood of them occurring may affect their overall significance.
- Each criterion is ranked with scores assigned as presented in Table 3-2 to determine the **overall significance** of an activity. The criterion is then considered in two categories, viz. effect of the activity and the likelihood of the impact. The total scores recorded for the effect and likelihood are then read off the matrix presented in Table 3-3, to determine the overall significance of the impact. The overall significance is either negative or positive.
- The **significance scale** is an attempt to evaluate the importance of a particular impact. This evaluation needs to be undertaken in the relevant context, as an impact can either be ecological or social, or both. The evaluation of the significance of an impact relies heavily on the values of the person making the judgment. For this reason, impacts of a social nature need to reflect the values of the affected society.

Cumulative Impacts

Cumulative impacts affect the significance ranking of an impact because the impact is taken in consideration of both onsite and offsite sources. For example, pollution making its way into a river from a development may be within acceptable national standards. Activities in the surrounding area may also create pollution which does not exceed these standards. However, if both onsite and offsite activities take place simultaneously, the total pollution level may exceed the standards. For this reason it is important to consider impacts in terms of their cumulative nature.

Seasonality

Although seasonality is not considered in the ranking of the significance, it may influence the evaluation during various times of the year. As seasonality will only influence certain impacts, it will only be considered for these, with management measures being imposed accordingly (i.e. dust suppression measures being implemented during the dry season).

Table 2.2: Significance Rating Table.

Temporal Scale (The duration of the impact)	
Short term	Less than 5 years (many construction phase impacts are of a short duration).
Medium term	Between 5 and 20 years.
Long term	Between 20 and 40 years (from a human perspective almost permanent).

Permanent	Over 40 years or resulting in a permanent and lasting change that will always be there.
Spatial Scale (The area in which any impact will have an affect)	
Individual	Impacts affect an individual.
Localised	Impacts affect a small area of a few hectares in extent. Often only a portion of the project area.
Project Level	Impacts affect the entire project area.
Surrounding Areas	Impacts that affect the area surrounding the development
Municipal	Impacts affect either the Local Municipality, or any towns within them.
Regional	Impacts affect the wider district municipality or the province as a whole.
National	Impacts affect the entire country.
International/Global	Impacts affect other countries or have a global influence.
Will definitely occur	Impacts will definitely occur.
Degree of Confidence or Certainty (The confidence with which one has predicted the significance of an impact)	
Definite	More than 90% sure of a particular fact. Should have substantial supportive data.
Probable	Over 70% sure of a particular fact, or of the likelihood of that impact occurring.
Possible	Only over 40% sure of a particular fact, or of the likelihood of an impact occurring.
Unsure	Less than 40% sure of a particular fact, or of the likelihood of an impact occurring.

Table 2.3: Impact Severity Rating.

Overall Significance (The combination of all the above criteria as an overall significance)	
VERY HIGH NEGATIVE	VERY BENEFICIAL
<p>These impacts would be considered by society as constituting a major and usually permanent change to the (natural and/or social) environment, and usually result in severe or very severe effects, or beneficial or very beneficial effects.</p> <p>Example: The loss of a species would be viewed by informed society as being of VERY HIGH significance.</p> <p>Example: The establishment of a large amount of infrastructure in a rural area, which previously had very few services, would be regarded by the affected parties as resulting in benefits with VERY HIGH significance.</p>	
HIGH NEGATIVE	BENEFICIAL

<p>These impacts will usually result in long term effects on the social and/or natural environment. Impacts rated as HIGH will need to be considered by society as constituting an important and usually long term change to the (natural and/or social) environment. Society would probably view these impacts in a serious light.</p> <p>Example: The loss of a diverse vegetation type, which is fairly common elsewhere, would have a significance rating of HIGH over the long term, as the area could be rehabilitated.</p> <p>Example: The change to soil conditions will impact the natural system, and the impact on affected parties (such as people growing crops in the soil) would be HIGH.</p>	
MODERATE NEGATIVE	SOME BENEFITS
<p>These impacts will usually result in medium to long term effects on the social and/or natural environment. Impacts rated as MODERATE will need to be considered by society as constituting a fairly important and usually medium term change to the (natural and/or social) environment. These impacts are real but not substantial.</p> <p>Example: The loss of a sparse, open vegetation type of low diversity may be regarded as MODERATELY significant.</p>	
LOW NEGATIVE	FEW BENEFITS
<p>These impacts will usually result in medium to short term effects on the social and/or natural environment. Impacts rated as LOW will need to be considered by the public and/or the specialist as constituting a fairly unimportant and usually short term change to the (natural and/or social) environment. These impacts are not substantial and are likely to have little real effect.</p> <p>Example: The temporary changes in the water table of a wetland habitat, as these systems are adapted to fluctuating water levels.</p> <p>Example: The increased earning potential of people employed as a result of a development would only result in benefits of LOW significance to people who live some distance away.</p>	
NO SIGNIFICANCE	
<p>There are no primary or secondary effects at all that are important to scientists or the public.</p> <p>Example: A change to the geology of a particular formation may be regarded as severe from a geological perspective, but is of NO significance in the overall context.</p>	
DON'T KNOW	
<p>In certain cases it may not be possible to determine the significance of an impact. For example, the primary or secondary impacts on the social or natural environment given the available information.</p> <p>Example: The effect of a particular development on people's psychological perspective of the environment.</p>	

2.5 Assumptions and Limitations

This report is based on currently available information and, as a result, the following limitations and assumptions are implicit–

- The data analysed in this report is based on one site surveys of plant species. Therefore seasonal trends are not assessed. In addition, some plant species, with particular seasonal/short-lived flowering, may have gone undetected.
- A detailed faunal survey was not conducted. Opportunistic sightings/observations of animals occurring within the study site were recorded. This information, combined with an assessment of potential habitat to support faunal species, was used to determine the likelihood of the presence of animal species within the project area.

3 RELEVANT LEGISLATION

The proposed housing development will be subject to the requirements of various items of South African legislation. These are described below.

Table 3.1: Environmental legislation considered in the preparation of the Ecological Impact Assessment for the proposed housing development

Title of Environmental legislation, policy or guideline	Implications for the proposed housing development
Constitution Act (No. 108 of 1996)	Obligation to ensure that the proposed development will not result in pollution and ecological degradation; and Obligation to ensure that the proposed development is ecologically sustainable, while demonstrating economic and social development.
National Environmental Management Act (NEMA) (No. 107 of 1998)	The developer must apply the NEMA principles, the fair decision-making and conflict management procedures that are provided for in NEMA. The developer must apply the principles of Integrated Environmental Management and consider, investigate and assess the potential impact of existing and planned activities on the environment, socio-economic conditions and the cultural heritage.
National Environment Management: Biodiversity Act (No. 10 of 2004)	The proposed development must conserve endangered ecosystems and protect and promote biodiversity; Must assess the impacts of the proposed development on endangered ecosystems; No protected species may be removed or damaged without a permit; The proposed site must be cleared of alien vegetation using appropriate means.
National Environmental Management: Protected Areas Act (No. 57 of 2003)	The objective of this Act is to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. In terms of Section 50 (1)(a)(ii) of this Act, the management authority may "Carry out or allow an activity in the reserve aimed at raising revenue". However, Section 50 (2) states that such activity may not negatively affect the survival of any species in, or significantly disrupt the integrity of the ecological system of the nature reserve. Furthermore, in terms Section 51 (a), the Minister or MEC is responsible for the regulations or restrictions of the development and other activities in a protected environment, "which may be inappropriate for the area, given the purpose for which the area was declared".
National Water Act (No. 36 of 1998)	This Act provides details of measures intended to ensure the comprehensive protection of all water resources, including the water reserve and water quality. This proposed development will likely trigger the need for a water-use license according to Sections 21 (c) and (i) of the Act (See Aquatic Impact Assessment).
National Heritage Resource Act (25 of 1999)	Protection of natural and cultural heritage sites into the layout and operation of the project, where applicable. Ensuring compliance with both the South African Heritage Resources Agency (SAHRA) and the Eastern Cape Provincial Heritage Resources Agency (ECPHRA)

4 DESCRIPTION OF THE ENVIRONMENT

The study sites and surrounding areas were described using a two-phased approach. Firstly, a desktop assessment of the site was conducted in terms of current vegetation classifications and biodiversity programmes and plans. This was followed by a site visit in order to assess the actual ecological state, current land-use, identify potential sensitive ecosystems and identify plant species located on the proposed project site.

4.1 Background and Literature review

Published literature on the ecology of the area was referenced in order to describe the study site in the context of the region and the Eastern Cape Province. The following documents/plans are referenced:

- SANBI vegetation (Mucina & Rutherford, 2006)
- Eastern Cape Biodiversity Conservation Plan (ECBCP)
- The National Freshwater Ecosystem Priority Areas (NFEPA)
- National Protected Areas Act (NO. 57 of 2003; NEMPAA) and the National Protected Areas Expansion Strategy (NPAES)
- Review of the SANBI Red Data List
- Convention on International Trade in Endangered Species (CITES),
- International Union for Conservation of Nature (IUCN),
- Provincial Nature Conservation Ordinance (PNCO),
- National Biodiversity Management: Biodiversity Act (NEMBA) List of Threatened or Protected Species,
- National Biodiversity Management: Biodiversity Act (NEMBA) List of Alien Invasive Vegetation
- Department of Agriculture, Forestry and Fisheries (DAFF) List of Protected Trees
- NEMBA list of threatened ecosystems

4.1.1 Climate

The climate of Potsdam is very similar to that of King William's town, located approximately 30km away. King Williams Town normally receives about 502mm of rain per year, with most rainfall occurring during the summer months. Figure 6.2 below shows the average rainfall values for King Williams Town per month, the average midday temperature per month and the average night-time temperatures. It receives the lowest rainfall (8mm) in July and the highest (80mm) in November. Average daily maximum temperatures range from 21°C in July to 26°C in February. The region is the coldest during July when the temperature drops to 8°C on average during the night.

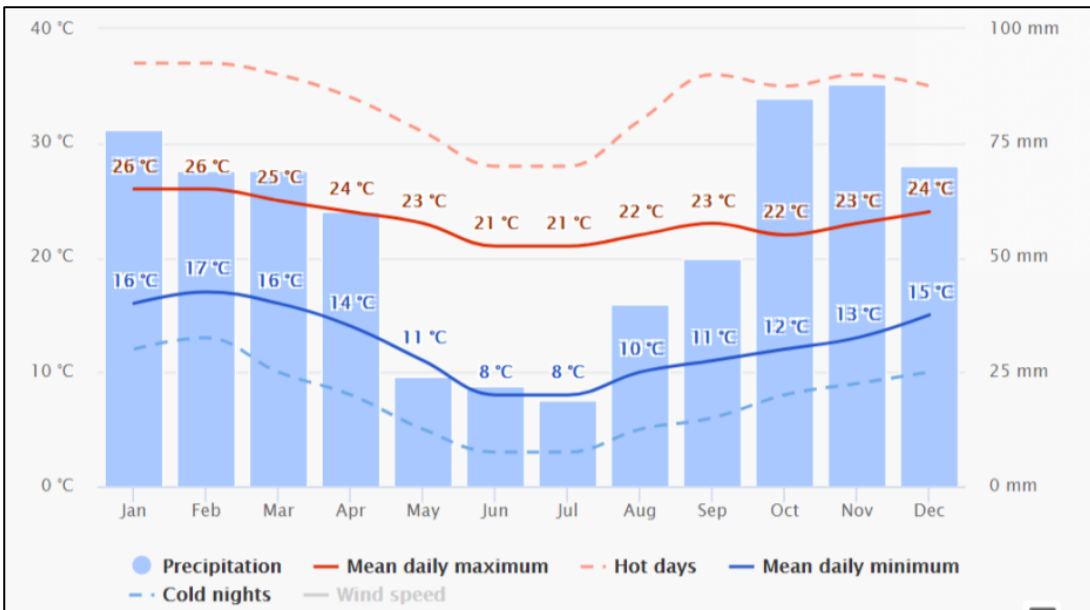


Figure 4.1: Average temperature and rainfall for King Williams Town (Metroblue, 2017)

4.1.2 Topography and Geology

The topography of the study area ranges between 320m to 390m above sea level, as indicated by Figure 4.2 below. Typically, the area is characterised by gently to moderately undulating landscapes and dissected hilltop slopes.

The site occurs in the Karoo Supergroup of rocks and consists of the Beaufort Group of rocks, including Adelaide and Escourt mudstone formations with dolerite.

The Soil type is classified as Type E1, which contains soils with minimal development, usually shallow on hard or weathering rock, with or without intermittent diverse soils (association of Leptosols, Regosols, Calcisols and Durisols. In addition one or more Cambisols and Luvisols may be present.

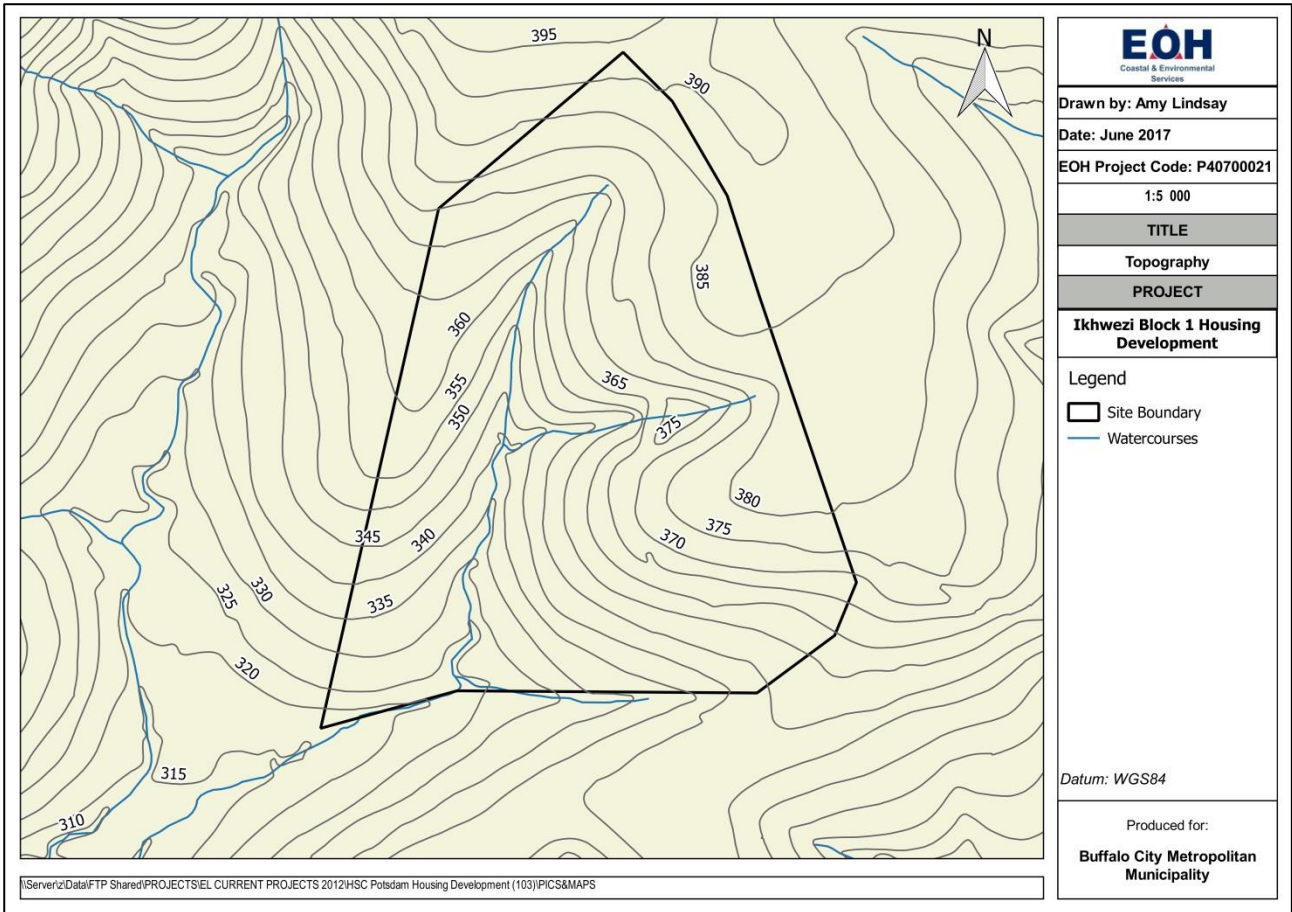


Figure 4.2: Topographic profile of the area of the proposed Ikhwezi Block 1 housing development.

4.2 Vegetation and Floristics

4.2.1 SANBI classification (Mucina and Rutherford, 2012)

The South African National Biodiversity Institute (SANBI) vegetation map for the Ikhwezi Block 1 housing development is provided in Figure 4.3 below. The map shows that the proposed activity falls within a single vegetation type, namely Albany Coastal Belt (AT 9). This vegetation type features on the gently to moderately undulating landscapes and dissected hilltop slopes close to the coast. It is dominated by short grasslands punctuated by scattered bush clumps of solitary *Acacia natalitia* trees (Mucina and Rutherford, 2012). This vegetation type is classified as “**Least Threatened**” (Mucina and Rutherford, 2012).

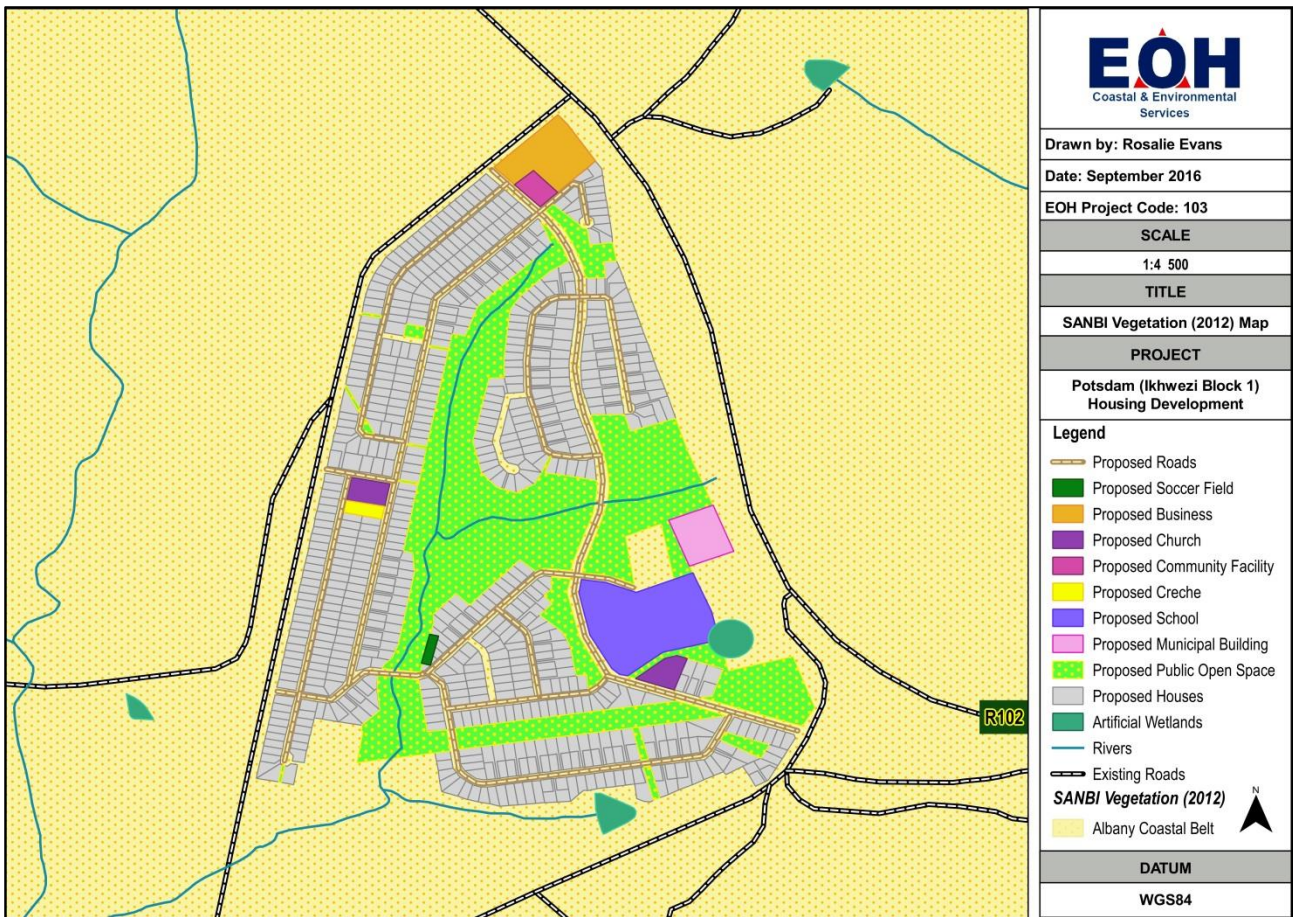


Figure 4.3: Map representing the SANBI Vegetation classification for the Potsdam Housing Development

4.2.2 Forest classification

No natural forest will be impacted by the proposed development.

4.3 Waterbodies

The area in which the proposed Ikhwezi Block 1 housing Development is situated is surrounded by a number of drainage lines, non-perennial streams (watercourses) and wetlands.

4.3.1 National Freshwater Ecosystem Priority Areas (NFEPA)

The water courses found within the proposed site ultimately feed into the Buffalo River, which is classified by NFEPA as a Class D River: Largely Modified (Figure 4.4). Figure 4.4 also indicates the regulated 32 meter buffer surrounding the water courses.

A number of wetlands were also observed within the proposed site. There are two wetlands that are listed in the NFEPA database as artificial wetlands. NFEPA Wetland 1 is a dam and NFEPA Wetlands 2 is a water reservoir. The proposed Ikhwezi Block 1 housing development will not directly impact on either of these NFEPA wetlands. Figure 4.4 also indicates the 500 m regulatory wetland buffer surrounding the NFEPA wetlands.

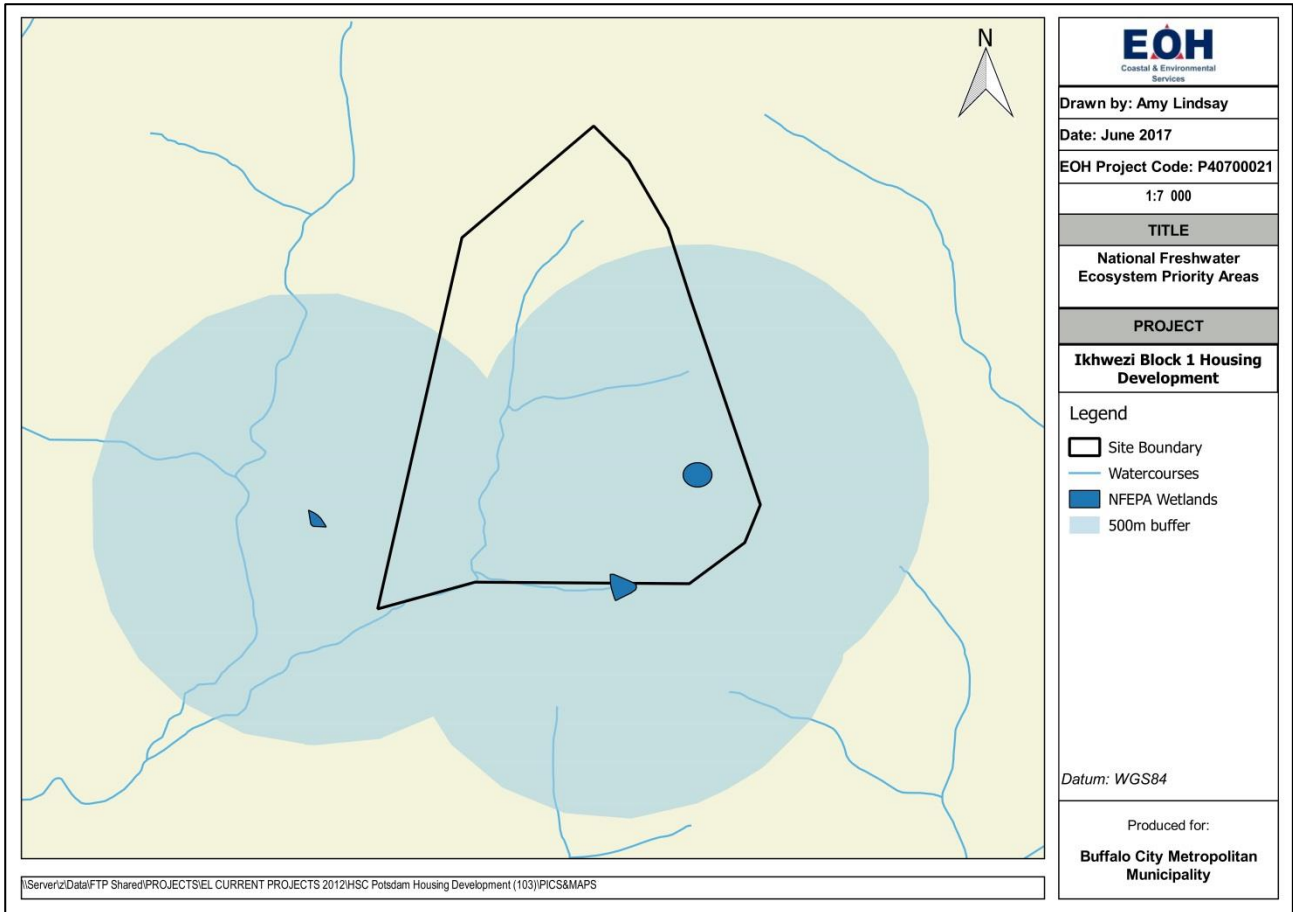


Figure 4.4: NFEPA wetlands surrounding and within the site of the proposed Ikhwezi Block 1 housing development

4.4 Land use

The South African Land-cover Map provides a key information requirement for a wide range of landscape planning, inventory and management activities. The recent global availability of Landsat 8 satellite imagery offered the opportunity to create a new, national land-cover dataset for South Africa, circa 2013-14, replacing and updating the previous 1994 and 2000 South African National Landcover datasets. The land cover for the proposed project area has been illustrated in Figure 4.5 below.

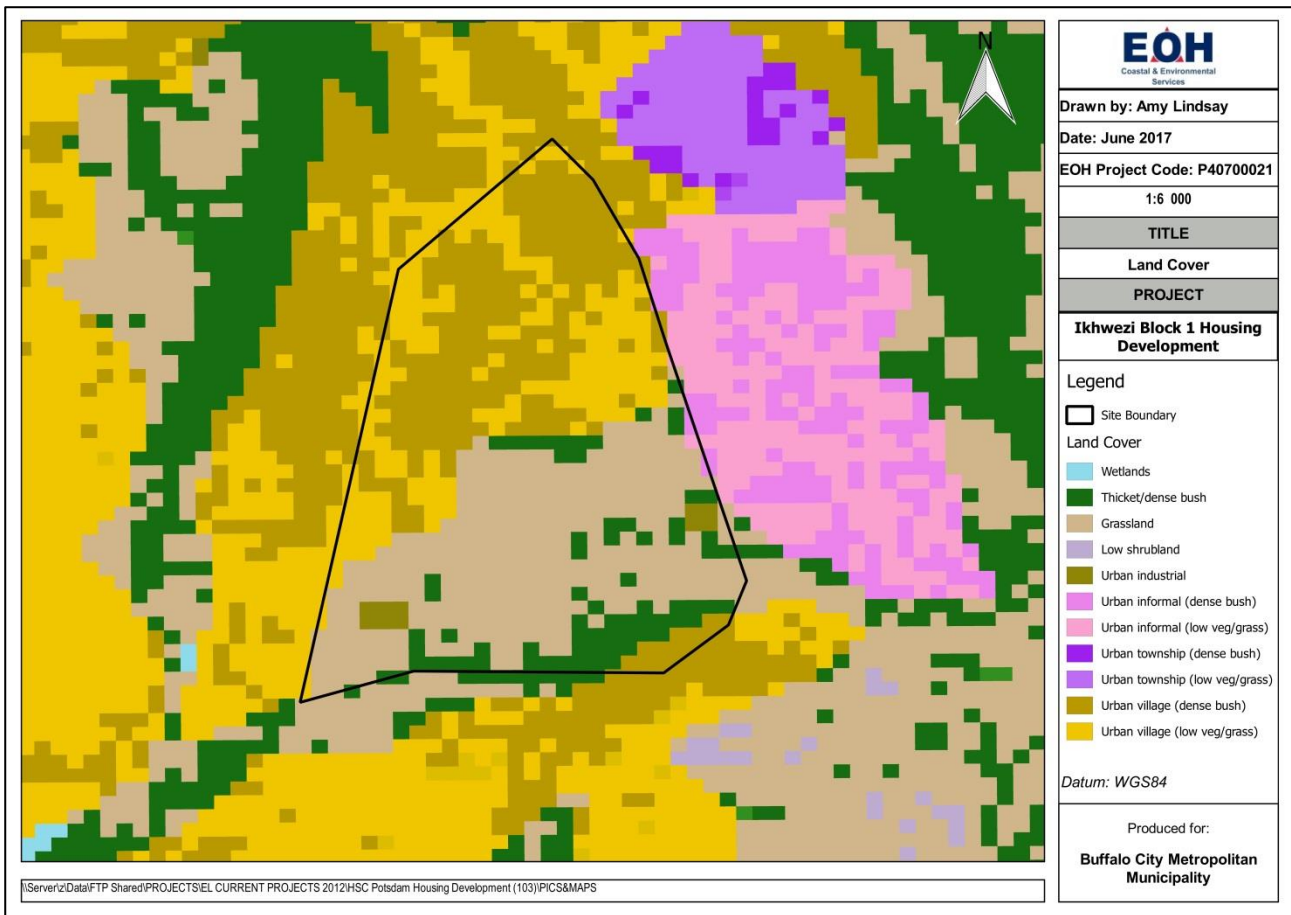


Figure 4.5: Land Cover map for the proposed Ikhwezi Block 1 Housing Development

The area in which the proposed Ikhwezi Block 1 housing development is located is found within the grassland and urban village areas. Urban informal and Urban townships are found in close proximity to the proposed site with little thick/dense bush and natural grassland remaining.

4.5 Biodiversity Conservation

South Africa's policy and legislative framework for biodiversity is well developed, providing a strong basis for the conservation and sustainable use of biodiversity. South Africa is one of the few countries in the world to have a Biodiversity Act and a National Biodiversity Institute.

Key components of the national policy and legislative framework for biodiversity include:

- The White Paper on the Conservation and Sustainable Use of South Africa's Biological Diversity (1997)
- The National Environmental Management: Biodiversity Act (Act 10 of 2004)
- The National Environmental Management: Protected Areas Act (Act 57 of 2003)
- The National Biodiversity Strategy and Action Plan (NBSAP) (2005)
- The National Spatial Biodiversity Assessment (NSBA) (2004, currently being reviewed and updated)
- The National Biodiversity Framework (NBF) (2008)
- The National Protected Area Expansion Strategy (NPAES) (2008)

In addition to national legislation, some of South Africa's nine provinces have their own provincial biodiversity legislation, as nature conservation is a concurrent function of national and provincial government in terms of the Constitution (Act 108 of 1996). The relevant biodiversity plan in the Eastern Cape is the ECBCP (2007).

4.5.1 Protected Areas (NEMPAA & NPAES)

NEMPAA provides for the protection and conservation of ecologically viable areas that is representative of South Africa’s biological diversity and its natural landscapes by listing a national register of all national, provincial and local protected areas. No National Protected Areas were identified within the general study area.

While no protected areas are located within the immediate vicinity of the proposed site, a number of protected areas are located south of the proposed site and include the following:

Name of protected area	Approximate distance from the proposed development
Brandis State Forest	11.5km
Bridle Drift Nature Reserve	9.8km
East London Coast Nature Reserve	10.2km
Craigmore State Forest	7.3km
Needs Camp Forest Reserve	7.3km

Figure 4.6 indicates the location of these protected areas.

It is unlikely that the proposed Ikhwezi Block 1 housing development will impact the nearby protected areas.

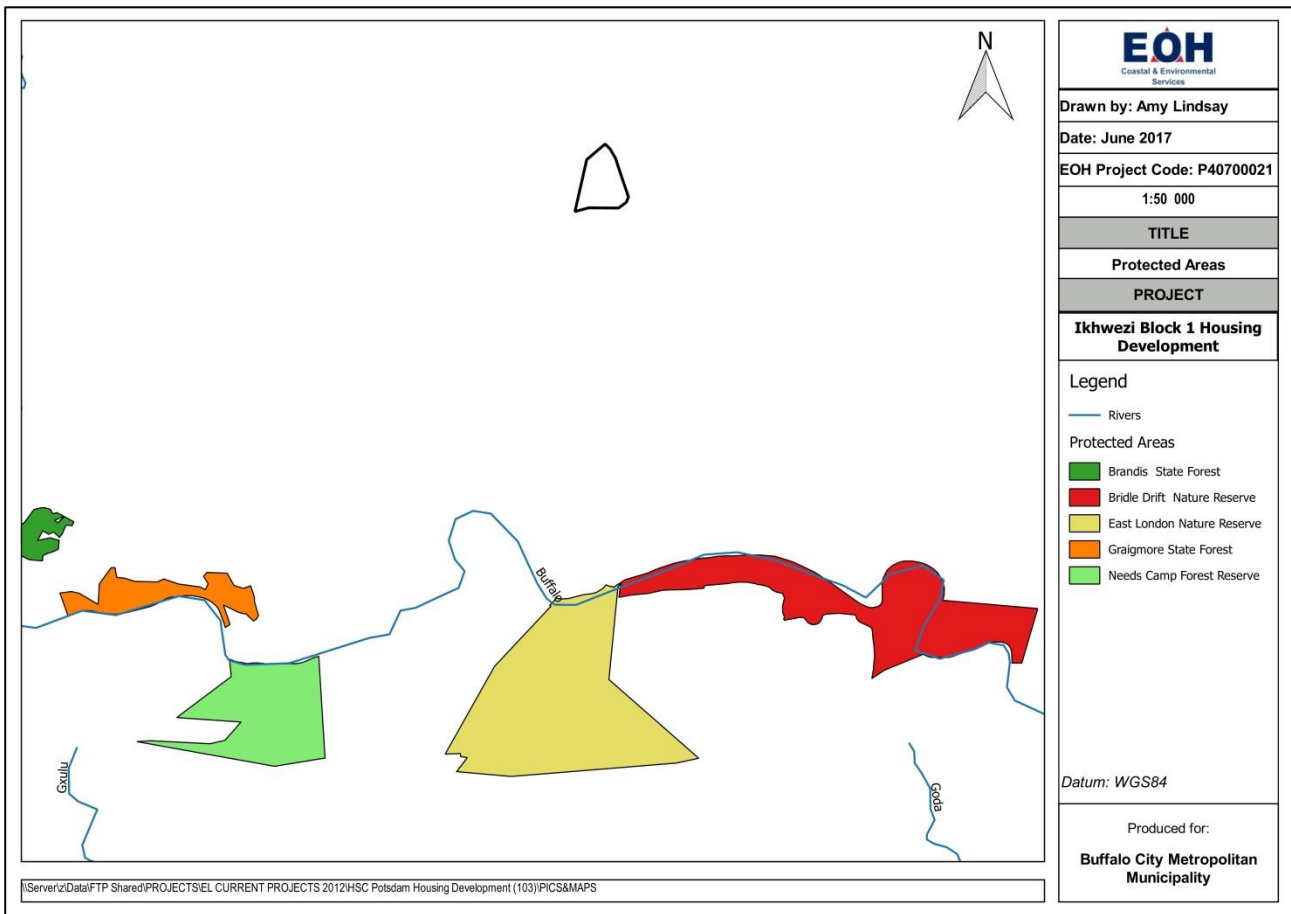


Figure 4.6: Protected areas surrounding the proposed Ikhwezi Block 1 housing development

4.5.2 Threatened ecosystems

The NEMBA National *List of Ecosystems that are Threatened and in Need of Protection* was released in 2011

and contains the first national list of threatened terrestrial ecosystems. The following categories were listed:

- **critically endangered (CR) ecosystems**, being ecosystems that have undergone severe degradation of ecological structure, function or composition as a result of human intervention and are subject to an extremely high risk of irreversible transformation;
- **endangered (EN) ecosystems**, being ecosystems that have undergone degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems;
- **vulnerable (VU) ecosystems**, being ecosystems that have a high risk of undergoing significant degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems or endangered ecosystems;
- **protected ecosystems**, being ecosystems that are of high conservation value or of high national or provincial importance, although they are not listed as critically endangered, endangered or vulnerable

There were no NEMBA threatened or protected ecosystems identified within the study area.

4.5.3 Eastern Cape Biodiversity Conservation Plan

The Eastern Cape Biodiversity Conservation Plan (ECBCP) attempts to map priorities areas for conservation in the province, as well as assigning land use categories depending on current conditions of unit areas and conservation targets that need to be achieved (Berliner *et al.* 2007). ECBCP, although mapped at a finer scale than the National Spatial Biodiversity Assessment is still, for the large part, inaccurate and “course” (Driver *et al.*, 2005). Therefore it is imperative that the status of the environment, for any proposed development MUST first be verified before the management recommendations associated with the ECBCP are considered (Berliner and Desmet, 2007).

The main outputs of the ECBCP are “critical biodiversity areas” or CBAs, which are allocated the following management categories:

- CBA 1 = Maintain in a natural state
- CBA 2 = Maintain in a near-natural state

Additional ECBCP land use management categories include:

- BLMC 3 = Functional landscapes
- BLMC 4 = Towns and Settlements, cultivated land or plantations

The study area falls within a functional landscape (Figure 4.7). It is recommended that these areas are managed for sustainable development, keeping natural habitat intact in wetlands (including wetland buffers) and riparian zones. Environmental authorisations should support ecosystem integrity.

- Outside of the CBAs, physical environmental attributes which should be avoided or at least be red-flagged in considering further development, include:
- Areas of steep slopes (>15% or 1 : 5) where slope stability and erosion threaten development;
- Wetlands, dams, river systems and estuaries where the emphasis must be placed on conserving the surface and groundwater environment;
- The coastal environment in particular the coastal protection zone in which the coastal land processes must be maintained;
- Development or activities within the coastal protection zone should be consistent with the principles and objectives of the White Paper for Sustainable Coastal Development and the Coastal Zone Management Act;
- High potential and unique agricultural land which needs to be managed as a means to ensure food security; and
- Cultural Heritage features and landscape quality which often underpin the tourism economy.

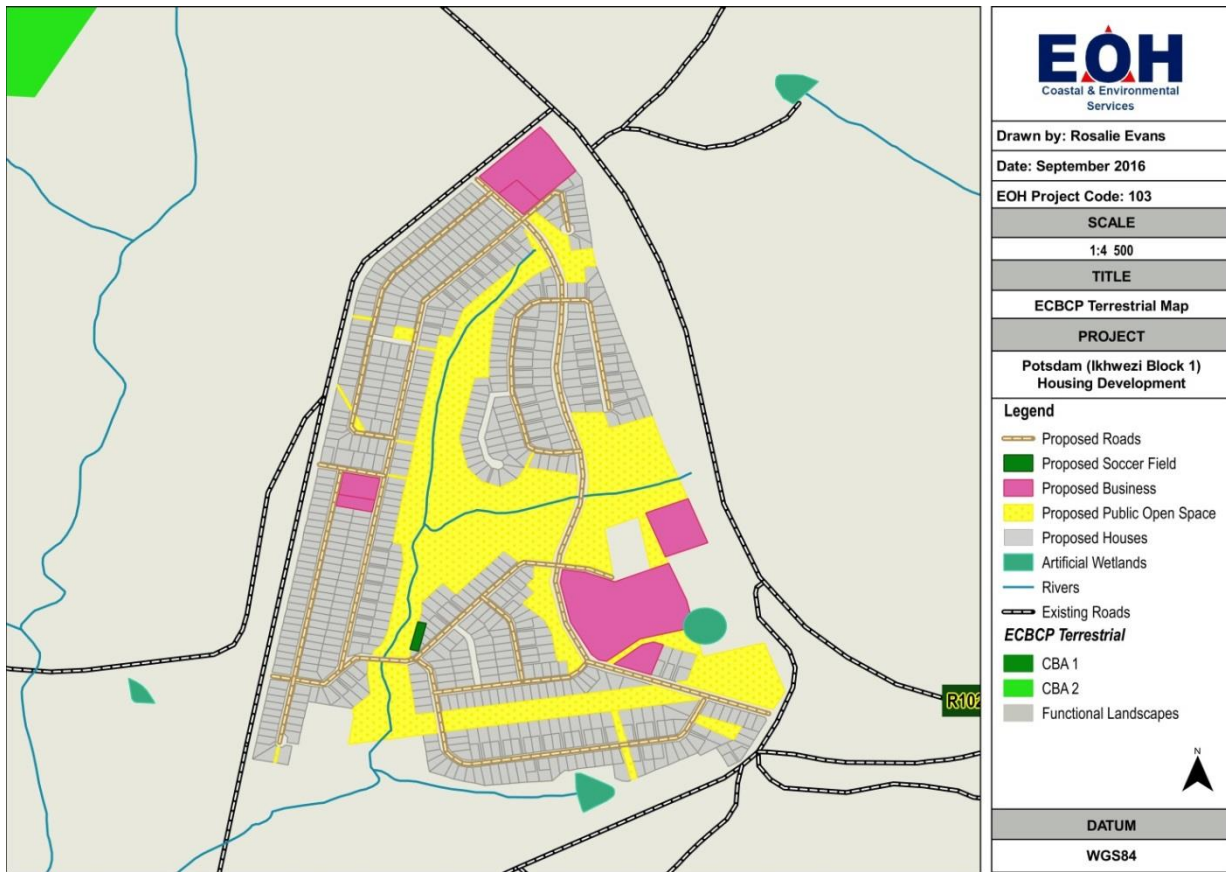


Figure 4.7: Critical Biodiversity Areas assessment of the study area, as per the ECBCP.

4.5.4 Conservation Status of plant species: Rare, or Threatened species

The following is a list of potential plant SCC were derived from current literature for vegetation found in the area as well as the international IUCN Red Data List, the South African Red Data List, DAFF protected trees and PNCO.

Table 4.1: List of potential plant SCC that may be found onsite

Family	Species	Common Name	Threat status
ACANTHACEAE	<i>Justicia bolusii</i> C.B. Clarke		Red Data - Rare
AMARYLLIDACEAE	<i>Boophone disticha</i> (L.f.) Herb.	Poison Bulb	PNCO: Protected
AMARYLLIDACEAE	<i>Cyrtanthus brachyscyphus</i> Baker	Dobo Lily	PNCO: Protected
AMARYLLIDACEAE	<i>Cyrtanthus sanguineus</i> (Lindl.) Walp. subsp. <i>sanguineus</i>	Kei Lily	PNCO: Protected
AMARYLLIDACEAE	<i>Scadoxus multiflorus</i> (Martyn) Raf. subsp. <i>katharinae</i> (Baker) Friis & Nordal	Blood Flower	PNCO: Protected
AMARYLLIDACEAE	<i>Scadoxus puniceus</i> (L.) Friis & Nordal	Snake Lily	PNCO: Protected
APOCYNACEAE	<i>Ceropegia carnososa</i> E.Mey.		PNCO: Endangered
ERICACEAE	<i>Erica unilateralis</i> Klotzsch ex Benth.		PNCO: Protected
IRIDACEAE	<i>Bobartia orientalis</i> J.B.Gillett subsp. <i>orientalis</i>	Geelblombiesie	PNCO: Protected
IRIDACEAE	<i>Gladiolus ochroleucus</i> Baker	Pypie	PNCO: Protected
IRIDACEAE	<i>Gladiolus permeabilis</i> D.Delaroche subsp. <i>edulis</i> (Burch. ex Ker Gawl.) Oberm.		PNCO: Protected
IRIDACEAE	<i>Gladiolus wilsonii</i> (Baker) Goldblatt & J.C.Manning		PNCO: Protected
IRIDACEAE	<i>Moraea elliotii</i> Baker		PNCO: Protected

Family	Species	Common Name	Threat status
IRIDACEAE	<i>Tritonia gladiolaris</i> (Lam.) Goldblatt & J.C.Manning	Pencilled Tritonia	PNCO: Protected
ORCHIDACEAE	<i>Brownleea coerulea</i> Harv. ex Lindl.		PNCO: Protected
ORCHIDACEAE	<i>Habenaria dregeana</i> Lindl.	Small Green Hood	PNCO: Protected
ORCHIDACEAE	<i>Satyrium membranaceum</i> Sw.		PNCO: Protected
ZAMIACEAE	<i>Encephalartos altensteinii</i> Lehm.	Giant Eastern Cape Cycad	PNCO: Endangered; NEMBA (Vulnerable)

5 SITE OBSERVATIONS AND DESCRIPTIONS

While National level vegetation maps have described broad vegetation types, local conditions and micro-habitats (rainfall, soil structure, rocky outcrops, etc.) can result in variations in plant composition. A site investigation was therefore conducted on the 21 June 2017 in order to confirm desktop findings, to assess the actual ecological state, current land-use, identify potential sensitive ecosystems and identify plant species located within the proposed project site. The site visit also served to inform potential impacts of the proposed project and how significantly it would impact on the surrounding ecological environment.

5.1 Vegetation communities and description

Three distinct vegetation communities were observed within and close to the proposed study site, namely:

- Albany coastal belt
- Transformed landscape
- Riparian vegetation

The vegetation communities observed are described below.



Figure 5.1: Vegetation observed within the Albany coastal belt vegetation community

- This vegetation communities includes areas where various grass species occur with scattered *Acacia natalita*.
- The herbaceous plant (*Bobartia orientalis*) was observed onsite and is an SCC identified in Table 4.1.
- A permit will have to be obtained in order to remove any SCC onsite within this vegetation type.
- Other bulbous and herbaceous plants may have gone unnoticed due to the lack of flowers.



Figure 5.2: Transformed land surrounding the proposed area.

- Transformed land in this instance includes all land that has been transformed by human activities.
- Transformed land within the study area was made up of human settlements.
- Overgrazing by livestock was observed.



- Numerous wetlands were observed to be associated discharge from the water reservoir located on the north eastern boundary of the site.
- Vegetation included grasses and sedges.
- Riparian vegetation was observed along the watercourses.
- Alien vegetation was observed along the watercourses, including Australian *Acacia*, bugweed and *Lantana*.



Figure 5.3: Riparian vegetation and wetlands found associated with watercourses throughout the study site.

Figure 5.4 below illustrates the different vegetation communities observed onsite. The majority of the vegetation observed onsite is described as Albany coastal thicket.



Figure 5.4: Vegetation types observed onsite.

5.2 Plant Species Observed

A number of species were identified to potentially occur within and surrounding the study area (Appendix 1). Of the species identified, 18 are listed as potential SCC (Table 4.1). These species are all Schedule 2 & 3 species on the Provincial Nature Conservation Ordinance Act 19 of 1974 or species protected by NEMBA. During the site visit, the following SCCs were observed and will require permits to be removed:

- *Bobartia orientalis* – Geelblombiesie (Figure 5.5)
- *Dietes grandiflora* (Figure 5.6)



Figure 5.5: *Bobartia orientalis*



Figure 5.6: *Dietes grandiflora*

5.3 Alien Invasive Species

Below is a list of all alien invasive plant species identified within the study site. These plants are classified according to the Conservation of Agricultural Resources Act (Act No. 43 of 1983 or CARA) and the National Environmental Management: Biodiversity Act (Act No. 10 of 2004): Alien and Invasive Species List, 2014. The CARA alien invasive list is only referenced where an alien invasive species that does not appear on the NEMBA list appears on the CARA list.

According to NEMBA, Category 1b species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be contained. A landowner upon whose land a Category 1b Listed Invasive Species occurs and which species is under the landowner’s control must:

- Comply with the provisions of section 73(2) of the Act; and
- Contain the Listed Invasive Species in compliance with section 75(1), (2) and (3) of the Act;

If an Invasive Species Management Programme has been developed in terms of regulation 7, a landowner must control the Listed Invasive Species in accordance with such programme. A landowner contemplated in sub-regulation (2) must allow an authorised official from the Department to enter onto the land to monitor, assist with or implement the containment of the Listed Invasive Species, or compliance with the Invasive Species Management Programme contemplated in regulation 7.

For Category 2 NEMBA requires that a Permit is required if growing, breeding or in any other way propagating any specimen.

Table 5.2: List of all alien invasive plant species identified.

Plant name	Common name	CARA classification status	NEMBA: Alien and Invasive Classification
<i>Acacia dealbata</i>	Silver wattle	Weed Category 2	2
<i>Acacia mearnsii</i>	Black wattle	Invader Category 2	2
<i>Ageratum conyzoides</i>	Invader <i>Ageratum</i>	Weed Category 1	1b
<i>Convolvulus arvensis</i>	Wild morning glory	Weed Category 1	
<i>Acacia saligna</i>	Fort Jackson	Invader Category 2	1b
<i>Solanum mauritianum</i>	Bugweed	Weed Category 1	1b

5.4 Animal species

No amphibians, reptiles, terrestrial invertebrates, birds and nesting areas or large mammals were observed onsite. Small mammals such as rodents, ground squirrels, bats and a variety of insects, amphibians and reptiles are expected to occur on site.

5.5 Wetlands and watercourses

5.5.1 Wetlands

During the site visit, it was observed that a number of wetlands that are not identified by NFEPA were present. These wetlands are indicated in Figure 5.7. Upon further investigation, it was found that the wetlands are the result of a discharge originating from the water reservoir located on the north eastern boundary of the site (Figure 5.8 and 5.9). A number of trenches were observed that connected each of the wetlands systems (Figure 5.10). These trenches presumably function to direct water from the discharge point to the watercourse located on the southern boundary of the site. A summary of the observed wetlands has been provided below:



Observed wetland 1:

- No clear riparian vegetation observed
- Some shallow surface water observed
- Soils have high clay content
- Core sampled revealed moderate mottling indicating a temporary zone



Observed wetland 2

- No clear riparian vegetation observed
- Soils have high clay content
- Core sampled revealed moderate mottling indicating a temporary zone



Observed wetland 3

- Sedges and riparian grasses observed
- Some shallow surface water observed
- Soils have high clay content
- Core samples revealed wet soil with notable organic content indicating a permanently wet zone.

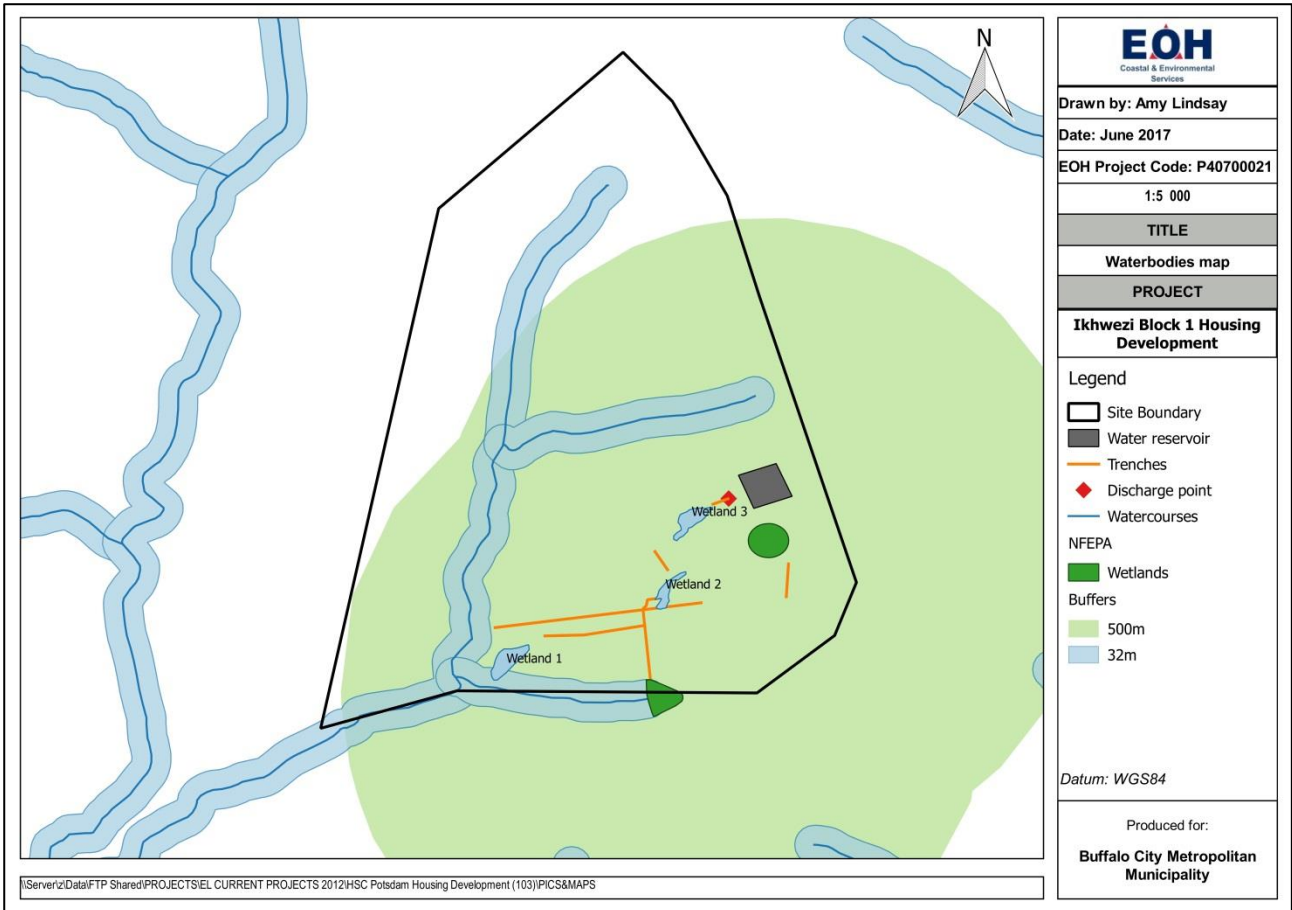


Figure 5.7: Wetlands, rivers and drainage lines associated with the study area.



Figure 5.8: The discharge point located below the water reservoir



Figure 5.9: The water reservoir from which the discharge originates from



Figure 5.10: A section of the trench that was dug to direct water away from the discharge point

5.5.2 Watercourses

Two watercourses are proposed to be impacted on by access roads associated the Ikhwezi Block 1 development. Figure 5.11 indicates the locations where the access roads will cross over the watercourses.

Watercourse crossing 1 is a small non-perennial tributary with highly eroded banks (Figure 5.12) while Watercourse crossing 2 is an existing crossing (Figure 5.13 and 5.14). Watercourse crossing 2 will be upgraded by having a tar surface laid onto of the existing gravel surface. The bed and banks of Watercourse crossing 2 will not be altered any further than they are currently.

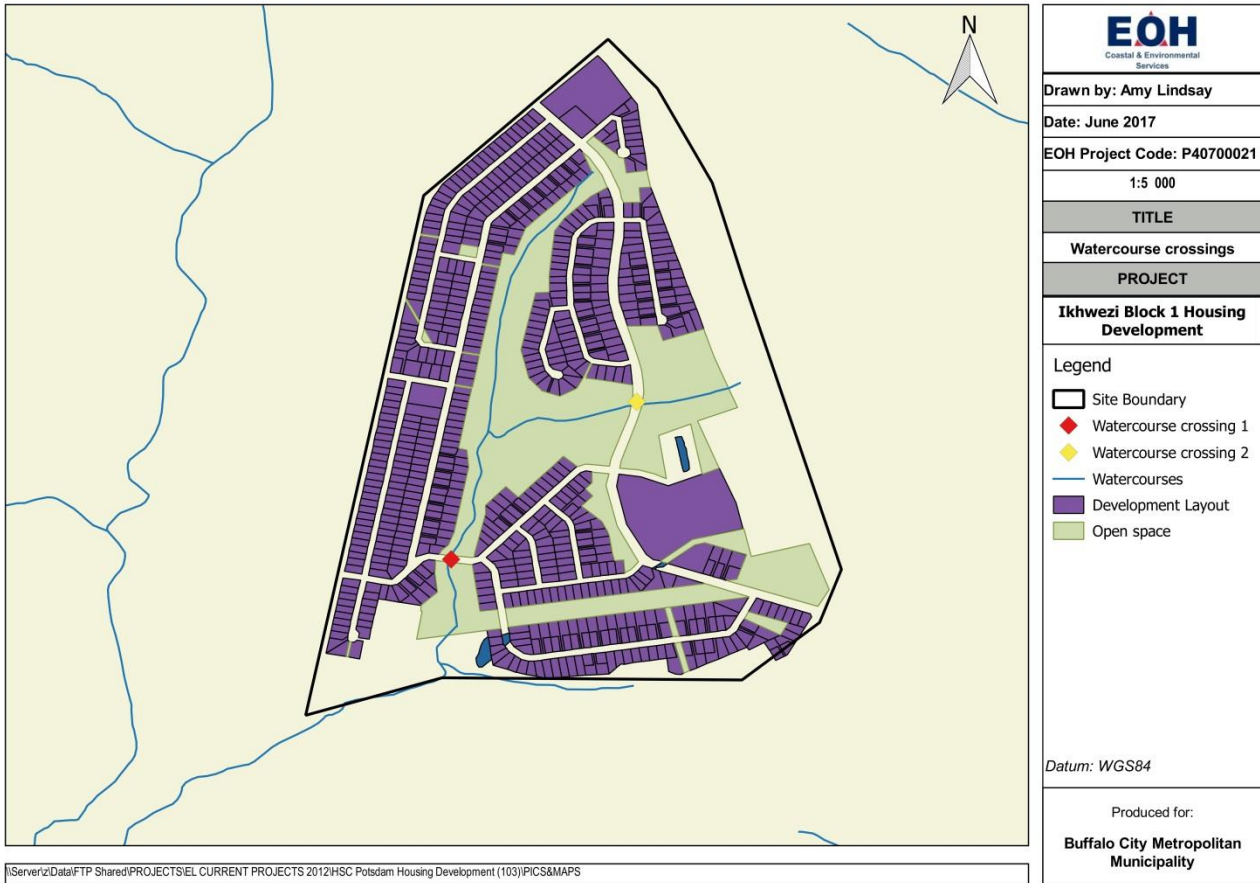


Figure 5.12: The location of the watercourse crossings associated with the access roads



Figure 5.13: The existing crossing at Watercourse crossing 2



Figure 5.14: Upstream and downstream pictures of Watercourse crossing 1



Figure 5.15: Upstream and downstream picture of Watercourse crossing 2

6 SITE SENSITIVITY

In terms of Appendix 6 of the EIA Regulations (2014) a specialist report must contain-

- (f) the specific identified sensitivity of the site related to the activity and its associated structures and infrastructure;
- (g) an identification of any areas to be avoided, including buffers;
- (h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;

6.1 Sensitivity map

A sensitivity map (Figure 6.1 below) was developed based on desktop and site information gathered, and was classified into areas of high, moderate and low sensitivity.

High Sensitivity

- All rivers and tributaries of the Rivers affected by the activity.
- All riparian vegetation identified onsite is classified as **high sensitivity** (Figure 6.1). All watercourses (with a 32 metre buffer) have been given **high sensitivity**.
- All activities within high sensitivity areas must be closely monitored by a qualified ECO to ensure that all proposed mitigation measures are implemented to manage and minimize potential impacts on the watercourse.

Moderate Sensitivity

- All artificial wetlands. In this instance three of the four artificial wetlands are the result of discharge released from the water reservoir. The fourth wetland is a dam and has little conservation value.
- 10 m buffer around the wetlands.
- Moderate sensitivity areas act as buffers for the high sensitivity areas. Activities that may have an indirect impact on high sensitivity areas are not to occur within these buffer areas. Such activities would include:
 - Stockpiling of topsoil, subsoil, etc.
 - Temporary ablution facilities
 - Site camp establishment
 - Temporary laydown areas for equipment/materials
 - Overnight parking of heavy machinery/vehicles.
 - Concrete batching

Low Sensitivity

Due to the status of the vegetation (Albany Coastal Belt) being "**Least Threatened**", this area has been given **low sensitivity**.

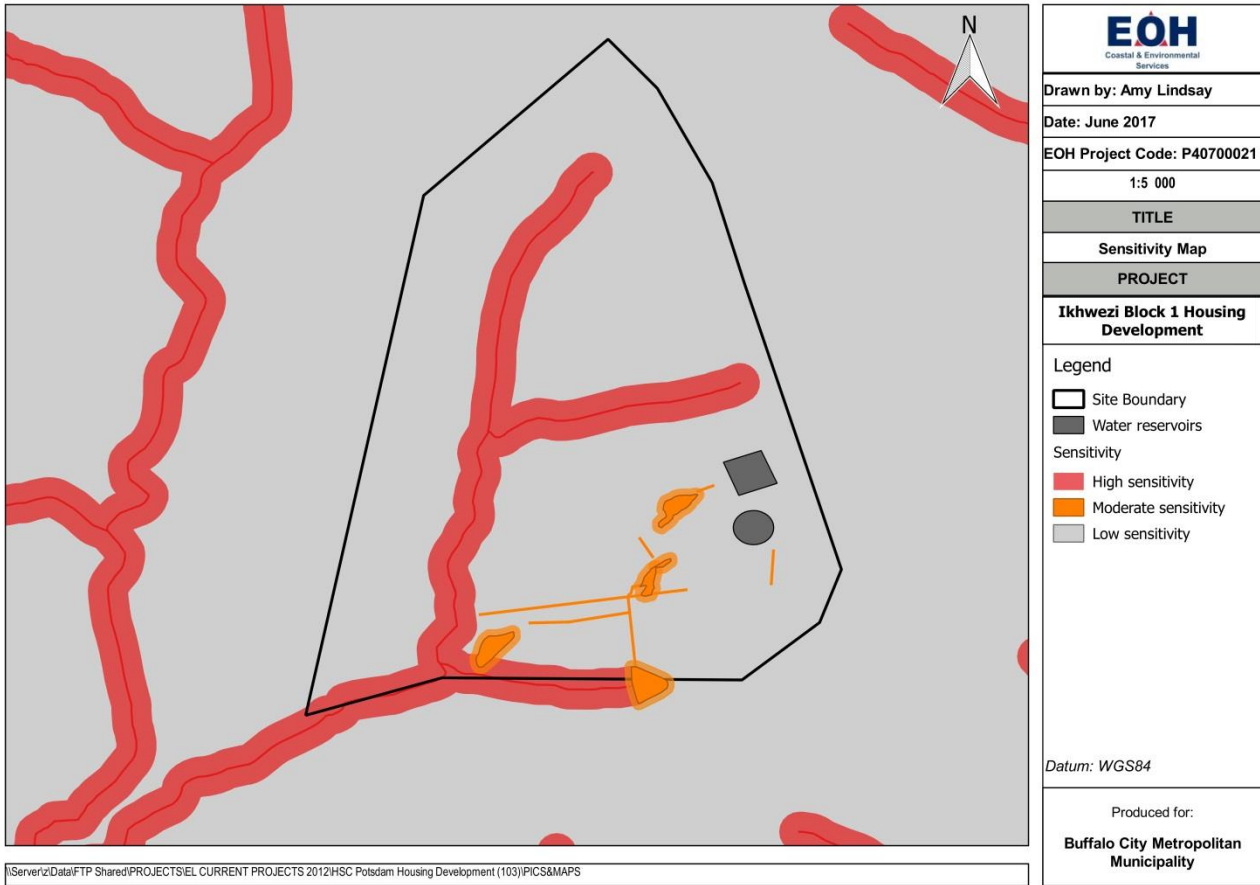


Figure 6.1. Sensitivity map for areas surrounding the proposed Ikhwezi Block 1 housing development.

6.2 Issues identified

The following issues were identified during the sensitivity assessment of the proposed project.

Table 6.1: Issues identified during the sensitivity assessment of the proposed study site and the different phases of development.

MIND MAP: Ecological Impact for Ikhwezi Block 1 housing development				
THEMES	CATEGORIES	PLANNING & DESIGN PHASE	CONSTRUCTION PHASE	OPERATIONAL PHASE
Ecological Environments	Legal and policy compliance	X		
	Changes to fluvial geomorphology and hydrology	X		X
	Scheduling of construction	X		
	Water Quality		X	
	Hydrology	X	X	
	Riparian Vegetation		X	
	Loss of natural vegetation	X	X	
	Loss of SCC	X	X	X
	Invasion of alien species	X	X	X
	Rehabilitation of disturbed areas			X

7 MANNER IN WHICH THE ENVIRONMENT MAY BE AFFECTED

In terms of Appendix 6 of the EIA Regulations (2014) a specialist report must contain-

- (j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment;
- (k) any mitigation measures for inclusion in the EMPr;

7.1 Impacts identified

Ecological impacts that were identified during the Planning and Design, Construction, Operational of the proposed Ikhwezi Block 1 housing development are indicated in Table 7.1. These included the consideration of direct, indirect and cumulative impacts that may occur.

Table 7.1: Impacts identified during the phases of the proposed Ikhwezi Block 1 housing development.

Categories	Applicability to each phase		
	Planning and Design	Construction	Operation
Legal and policy compliance	YES Non-compliance with the laws and policies of South Africa as they pertain to the ecological environment	N/A	N/A
Changes to fluvial geomorphology	YES Inappropriate design of bridge pilings and culverts.	N/A	YES Incorrect design of bridge pilings and culverts.
Scheduling of construction	YES Inappropriate scheduling of construction.	N/A	N/A
Water Quality	N/A	YES Accidental spills of hazardous substances (wet concrete, sewage etc.)	N/A
Hydrology	YES Redirection of trenches to reduce surface water.	N/A	N/A
	N/A	YES Coffer dams used while constructing the access road over watercourse crossing 1 may permanently change the flow dynamics in the stream.	N/A
Riparian vegetation	N/A	YES Inappropriate removal of riparian vegetation.	N/A

Categories	Applicability to each phase		
	Planning and Design	Construction	Operation
Loss of natural vegetation	YES Unnecessary loss of vegetation.	YES Unnecessary loss of vegetation.	N/A
Loss of SCC	YES Inappropriate design of the project infrastructure.	YES Clearing of natural vegetation may result in the loss of identified and unidentified SCC.	N/A
Invasion of alien species	YES Failure to plan for the removal and management of alien vegetation.	YES Removal of existing natural vegetation resulting in invasion by alien species.	YES Lack of effective alien management plan resulting in invasion by alien species.
Rehabilitation of disturbed areas	N/A	YES Poor rehabilitation throughout construction may lead to the degradation of ecosystems.	YES Continued rehabilitation in open spaces.

7.2 Impact assessment

The impacts identified in Section 7.1 are assessed in terms of the criteria described in Section 2.4.7 and are summarised in the tables below (Table 7.2 – 7.5).

Table 7.2: Assessment and mitigation of impacts during all phases of the development.

ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
PLANNING & DESIGN PHASE									
<i>ECOLOGICAL IMPACT ASSESSMENT</i>									
Legal and policy compliance	During the planning and design phase non-compliance with the laws and policies of South Africa as they pertain to the ecological environment could lead to damage of the ecological environment, unnecessary delays in construction activities, and potentially criminal cases, based on the severity of the non-compliance, being brought against the proponent and his/her contractors.	Direct, Cumulative	Localised	Short-term	Probable	Moderately severe	Moderate Negative	<ul style="list-style-type: none"> All legal matters pertaining to permitting must be completed prior to any construction activity. In particular, all necessary Water Use Licences must be in order for construction activities within 32 metres of a watercourse and within 500 m of a wetland. The relevant permits must be obtained from the competent authority in order to remove any protected plant species. 	Low Negative
Changes to fluvial geomorphology and hydrology	During the planning and design phase the inappropriate design of the access road bridge across the watercourses may result in scouring of the river bed in areas immediately surrounding the infrastructure, or changes to the hydrology of the river.	Direct, cumulative	Localised	Long-term	Possible	Severe	High Negative	<ul style="list-style-type: none"> Scour countermeasures must be incorporated into the design of the weir. The access road bridge must be designed by an appropriately qualified engineer. The access road bridge design must comply with DWS standards and WULAs must be submitted where necessary. 	Low Negative
Scheduling of construction	During the planning and design phase the inappropriate construction scheduling that does not take into account the season requirements of the environment (e.g. allowing for unimpeded flood events) could lead to short-term, and possible long-term, impacts on aquatic environments, such as excessive sediment mobilization.	Indirect	Localised	Short-term	Possible	Moderately severe	Low Negative	<ul style="list-style-type: none"> Where possible, construction activities within watercourses should be undertaken during the driest part of the year to minimise downstream sedimentation due to excavation, etc. When not possible, suitable stream diversion structures must be used to ensure the river is not negatively impacted by construction activity. 	Low Negative
Hydrology	During the Planning and Design Phase, the inappropriate layout of the existing trenches that direct water from the discharge point results in wetlands forming and compromises the integrity of the surface soils that the housing development will be constructed on.	Direct	Localised	Medium-term	Definite	Moderately severe	Moderate Negative	<ul style="list-style-type: none"> The existing trenches must be filled and new trenches must be dug to direct discharged water down the north eastern boundary of the site and directly into the watercourse. 	Low Negative
Loss of natural vegetation	During the planning and design phase the inappropriate design of the project infrastructure will lead to the unnecessary loss of natural vegetation.	Direct, indirect, cumulative	Localised	Permanent	Definite	Moderately severe	Low Negative	<ul style="list-style-type: none"> The layout of the project infrastructure must have as minimal impact on natural vegetation as possible 	Low Negative
Loss of SCC	During the planning and design phase the inappropriate design of the project infrastructure will lead to the unnecessary loss of SCC.	Direct	Localised	Permanent	Probable	Moderately severe	Moderate Negative	<ul style="list-style-type: none"> All plant SCC must be relocated to outside the construction footprint prior to commencement of activities. The relevant permits must be obtained from the competent authority in order to remove any SCC. 	Low Negative
Invasion of alien plant species	During the planning and design phase the failure to plan for the removal and management of alien vegetation could result in the invasion of alien vegetation in riparian areas during the construction and operation phase.	Indirect	Project Level	Medium-term	Probable	Moderately severe	Moderate Negative	<ul style="list-style-type: none"> A Rehabilitation and Alien Vegetation Management Plan must be designed to reduce the establishment and spread of undesirable alien plant species. 	Low Negative
CONSTRUCTION PHASE									
Water Quality	During the construction phase	Direct,	Study Site	Short-term	Possible	Severe	High Negative	<ul style="list-style-type: none"> During the construction phase no machinery 	Low Negative

ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
	accidental spills of hazardous substances (wet concrete, sewage etc.) in the vicinity of the rivers/wetlands will result in water pollution, adversely affecting the aquatic ecosystem.	Cumulative						must be parked overnight within 100 m of the rivers/wetlands. <ul style="list-style-type: none"> All stationary machinery must be equipped with a drip tray to retain any oil leaks. No ablution facilities should be located within 50 m of any river or wetland system. Chemical toilets must be regularly maintained/serviced to prevent ground or surface water pollution. 	
Hydrology	During the construction phase coffer dams left in place for too long may permanently change the flow dynamics in the rivers, exacerbating scour and enhancing sedimentation. Both of these changes can impact negatively on the health of the aquatic ecosystem.	Direct, Cumulative	Localised	Medium-term	Possible	Severe	Moderate Negative	<ul style="list-style-type: none"> During the construction phase coffer dams must not be left in place for longer than 30 days. All work within the rivers should be completed during the dry season, when flows are at their lowest. Water in the rivers must be allowed to pass downstream of the construction activity. If necessary this should be achieved via a temporary diversion – this should not be in place for more than 30 days. 	Low Negative
Riparian Vegetation	During the construction phase the inappropriate removal of sensitive riparian vegetation (for road construction) will adversely affect the aquatic environment.	Direct	Study site	Medium-term	Possible	Moderately severe	Moderate Negative	<ul style="list-style-type: none"> Removal of riparian vegetation must take place under the supervision of the ECO. A rehabilitation and Alien Vegetation Management Plan must be developed and implemented during construction. Vehicles and machinery must not encroach into sensitive areas outside the proposed feedlot footprint. 	Low Negative
Loss of Natural Vegetation	During the construction phase the clearing of natural vegetation outside the approved housing development footprint will lead to the unnecessary loss of natural vegetation.	Direct, Indirect, Cumulative	Localised	Medium-term	Possible	Moderately severe	Moderate Negative	<ul style="list-style-type: none"> The construction footprint must be surveyed and demarcated prior to construction commencing. Where vegetation has been cleared, site rehabilitation in terms of soil stabilisation and vegetation must be undertaken. 	Low Negative
Loss of SCC	During the construction phase the clearing of natural vegetation may lead to the destruction of habitats and the loss of identified and unidentified plant SCC.	Direct, Indirect, Cumulative	Study Site	Medium-term	Probably	Moderately severe	Moderate Negative	<ul style="list-style-type: none"> All areas that will be impacted must be surveyed by a suitably qualified botanist/ecologist prior to topsoil removal in order to locate and rescue any SCC within the area and relocate them. No SCC must be removed from site. All SCC must be relocated immediately outside of the construction and operational footprint. Search and rescue must be undertaken by a professional and qualified botanist. The contractor's staff must not poach or trap wild animals. The contractor's staff must not harvest any natural vegetation. 	Low Negative
Invasion of Alien Species	During the construction phase the removal of natural vegetation (including riparian vegetation) creates 'open' habitats that will favour the establishment of undesirable alien plant species in areas that are typically very difficult to eradicate and may pose a threat to neighbouring natural	Indirect	Study Site	Long-term	Probable	Moderately severe	Moderate Negative	<ul style="list-style-type: none"> An Alien Management Plan must be developed and implemented during the construction phase to reduce the establishment and spread of undesirable alien plant species. Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting, etc. 	Low Negative

ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
	ecosystems.								
Rehabilitation of Disturbed Areas	During the construction phase poor continuous rehabilitation of disturbed areas may lead to the permanent degradation of ecosystems as well as allow alien vegetation species to expand.	Direct, Indirect, Cumulative	Localised	Long-term	Probable	Moderately severe	Moderate Negative	<ul style="list-style-type: none"> All temporarily impacted areas must be rehabilitated with indigenous vegetation. Only topsoil from the immediate area must be used for rehabilitation. All temporarily impacted areas must be restored as per the Rehabilitation Management Plan. 	Low Negative
OPERATIONAL PHASE									
Changes to Fluvial Geomorphology	During the operational phase incorrectly designed bridge and culverts may result in scouring of the river bed in areas immediately surrounding the pilings or culverts or changes to the hydrology of the affected rivers.	Direct	Study Site	Long-term	Possible	Moderately severe	Moderate Negative	<ul style="list-style-type: none"> Scour countermeasures must be incorporated into the design of the bridges and all culverts in the study area. All culverts must be designed in such a manner so as not to impede or divert baseflows or increase upstream flood inundation. An Erosion and Sediment Management Plan must be implemented to minimise the ingress of sediment-laden stormwater into rivers/wetlands. 	Low Negative
Invasion of Alien Species	During the operational phase the loss of natural vegetation will increase the potential invasion by alien plant species. This coupled with the lack of an effective alien vegetation management plan may result in large scale alien plant invasion.	Direct, Indirect, Cumulative	Study Site	Long-Term	Possible	Moderately Severe	Moderate Negative	<ul style="list-style-type: none"> An Alien Vegetation Management Plan must be implemented during the operational phase to reduce the establishment and spread of undesirable alien plant species. Alien plants must be removed through appropriate methods such as hand pulling, application of chemicals, cutting, etc. as in accordance to the NEMBA: Alien Invasive Species Regulations. 	Low Negative
Rehabilitation of disturbed areas	During the Operational Phase, continuous rehabilitation of disturbed areas may lead to the permanent degradation of ecosystems as well as allow alien vegetation species to expand.	Direct, Indirect, Cumulative	Study Site	Long-Term	Possible	Moderately Severe	Moderate Negative	<ul style="list-style-type: none"> All cleared areas must be continuously rehabilitated with indigenous vegetation for 6 months after the Operational Phase of the project begins, or until such time that the ECO is satisfied the all affected areas have been rehabilitated. 	Low Negative

8 IMPACT STATEMENT, CONCLUSION AND RECOMMENDATIONS

In terms of Appendix 6 of the EIA Regulations (2014) a specialist report must contain-

- (l) any conditions for inclusion in the environmental authorisation;
- (m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;
- (n) a reasoned opinion-
 - (i) as to whether the proposed activity or portions thereof should be authorised; and
 - (ii) if the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;

8.1 Conclusions

The following table summarises the change in impacts from pre- to post- mitigation for the proposed Ikhwezi Block 1 housing development near Potsdam, BCM.

Table 8.1: Assessment of pre- and post-mitigation impact significance.

	PRE-MITIGATION				POST-MITIGATION			
	LOW	MODERATE	HIGH	UN-KNOWN	LOW	MODERATE	HIGH	UN-KNOWN
Planning and Design	2	5	1	0	7	0	0	0
Construction	0	6	1	0	7	0	0	0
Operational	0	3	0	0	3	0	0	0
TOTAL	2	14	2	0	17	0	0	0

8.2 Current status

The vegetation on the study site is mostly transformed. Some SCCs were observed onsite and will require permits before they can be removed.

8.3 Recommendations

All riparian vegetation is classified as “*high sensitivity*” (coloured red in Figure 6.1) due to their association with waterbodies (drainage systems & wetlands) and their ecological importance to these waterbodies.

All the mitigation measures provided below are to be implemented in the Planning and Design, Construction and Operational Phases for the proposed Ikhwezi Block 1 housing development.

8.3.1 Planning and Design Phase

The following conditions associated with Planning and Design Phase must be implemented:

Legal and Policy Compliance

- All legal matters pertaining to permitting must be completed prior to any construction activity.
- In particular, all necessary Water Use Licences must be in order for construction activities within 32 metres of a watercourse and within 500 m of a wetland.

- The relevant permits must be obtained from the competent authority in order to remove any protected plant species.

Changes to fluvial geomorphology and hydrology

- Scour countermeasures must be incorporated into the design of the weir.
- The access road bridge must be designed by an appropriately qualified engineer.
- The access road bridge design must comply with DWS standards and WULAs must be submitted where necessary.

Scheduling of construction

- Where possible, construction activities should be undertaken during the driest part of the year to minimise downstream sedimentation due to excavation, etc.
- When not possible, suitable stream diversion structures must be used to ensure the river is not negatively impacted by construction activity.

Hydrology

- The existing trenches must be filled and new trenches must be dug to direct discharged water down the north eastern boundary of the site and directly into the watercourse.

Loss of natural vegetation

- The layout of the project infrastructure must have as minimal impact on natural vegetation as possible.

Loss of SCC

- All plant SCC must be relocated to outside the construction footprint prior to commencement of activities.
- The relevant permits must be obtained from the competent authority in order to remove any SCC.

Invasion of alien plant species

- A Rehabilitation and Alien Vegetation Management Plan must be designed to reduce the establishment and spread of undesirable alien plant species.

8.3.2 Construction Phase

The following conditions associated with Construction Phase must be implemented:

Water quality

- During the construction phase no machinery must be parked overnight within 100 m of the rivers/wetlands.
- All stationary machinery must be equipped with a drip tray to retain any oil leaks.
- No ablution facilities should be located within 50 m of any river or wetland system.
- Chemical toilets must be regularly maintained/serviced to prevent ground or surface water pollution.

Hydrology

- During the construction phase coffer dams must not be left in place for longer than 30 days.
- All work within the rivers should be completed during the dry season, when flows are at their lowest.
- Water in the rivers must be allowed to pass downstream of the construction activity. If necessary this should be achieved via a temporary diversion – this should not be in place for more than 30 days.

Riparian vegetation

- Removal of riparian vegetation must take place under the supervision of the ECO.
- A rehabilitation and Alien Vegetation Management Plan must be developed and implemented during construction.
- Vehicles and machinery must not encroach into sensitive areas outside the proposed feedlot footprint.

Loss of natural vegetation

- The construction footprint must be surveyed and demarcated prior to construction commencing.
- Where vegetation has been cleared, site rehabilitation in terms of soil stabilisation and revegetation must be undertaken.

Loss of SCC

- All areas that will be impacted must be surveyed prior to topsoil removal in order to locate and rescue any SCC within the area and relocate them.
- No SCC must be removed from site. All SCC must be relocated immediately outside the construction and operational footprint.
- Search and rescue must be undertaken by a professional and qualified botanist.
- The contractor's staff must not poach or trap wild animals.
- The contractor's staff must not harvest any natural vegetation.

Invasion of alien species

- An Alien Management Plan must be developed and implemented during the construction phase to reduce the establishment and spread of undesirable alien plant species.
- Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting, etc.

Rehabilitation of disturbed areas

- All temporarily impacted areas must be rehabilitated with indigenous vegetation.
- Only topsoil from the immediate area must be used for rehabilitation.
- All temporarily impacted areas must be restored as per the Rehabilitation Management Plan.

8.3.3 Operational Phase

The following conditions associated with the Operational Phase must be implemented:

Changes to fluvial geomorphology

- Scour countermeasures must be incorporated into the design of the bridges and all culverts in the study area.
- All culverts must be designed in such a manner so as not to impede or divert baseflows or increase upstream flood inundation.
- An Erosion and Sediment Management Plan must be implemented to minimise the ingress of sediment-laden stormwater into rivers/wetlands.

Invasion of alien plant species

- An Alien Plant Management Plan must be implemented during the operational phase to reduce the establishment and spread of undesirable alien plant species.
- Alien plants must be removed through appropriate methods such as hand pulling, application of chemicals, cutting, etc. as in accordance to the NEMBA: Alien Invasive Species Regulations.

Rehabilitation of disturbed areas

- All cleared areas must be continuously rehabilitated with indigenous vegetation for 6 months after the Operational Phase of the project begins, or until such time that the ECO is satisfied the all affected areas have been rehabilitated.

8.4 Proposed management plans to be developed and implemented as part of the final EMPr

In summary, the following plans need to be developed as part of the final EMPr and Project monitoring, incorporating all the issues, conclusions and recommendations of this report:

- Erosion and Sediment Management Plan
- Rehabilitation and Alien Vegetation Management Plan

8.5 Environmental Statement and Opinion of the Specialist

The ecological impacts of all aspects for the proposed Ikhwezi Block 1 housing development were assessed and considered to be ecologically acceptable, provided that the mitigation measures provided in this report are implemented. All impacts are rated as **MODERATE to HIGH pre-mitigation** (Table 8.1), therefore implementation of recommended mitigation measures coupled with comprehensive rehabilitation and monitoring in terms of re-vegetation and restoration is an important element of the mitigation strategy. Implementing the recommended mitigations measures will **reduce impacts to LOW**.

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APPENDIX A

Family	Species	Threat status	Common Name	Lifecycle	Growth forms
ACANTHACEAE	<i>Crabbea nana</i> Nees	LC		Perennial	Dwarf shrub, herb
ACANTHACEAE	<i>Justicia betonica</i> L.	LC		Perennial	Dwarf shrub, herb
ACANTHACEAE	<i>Justicia capensis</i> Thunb.	LC	Money Plant	Perennial	Dwarf shrub, herb
ACANTHACEAE	<i>Justicia petiolaris</i> (Nees) T.Anderson subsp. <i>bowiei</i> (C.B.Clarke) Immelman	LC		Perennial	Shrub
ACANTHACEAE	<i>Justicia bolusii</i> C.B.Clarke	Red Data - Rare		Perennial	Herb, scrambler, shrub
AIZOACEAE	<i>Aizoon rigidum</i> L.f.	LC		Perennial	Herb, succulent
AIZOACEAE	<i>Tetragonia decumbens</i> Mill.	LC		Perennial	Herb, succulent
AMARANTHACEAE	<i>Pupalia lappacea</i> (L.) A.Juss. var. <i>lappacea</i>	LC	Forest Burr	Perennial	Herb
AMARANTHACEAE	<i>Alternanthera pungens</i> Kunth	Not Evaluated		Annual	Herb
AMARYLLIDACEAE	<i>Boophone disticha</i> (L.f.) Herb.	PNCO: Protected	Poison Bulb	Perennial	Geophyte, succulent
AMARYLLIDACEAE	<i>Cyrtanthus brachyscyphus</i> Baker	PNCO: Protected	Dobo Lily	Perennial	Geophyte
AMARYLLIDACEAE	<i>Cyrtanthus sanguineus</i> (Lindl.) Walp. subsp. <i>sanguineus</i>	PNCO: Protected	Kei Lily	Perennial	Geophyte
AMARYLLIDACEAE	<i>Scadoxus multiflorus</i> (Martyn) Raf. subsp. <i>katharinae</i> (Baker) Friis & Nordal	PNCO: Protected	Blood Flower	Perennial	Geophyte
AMARYLLIDACEAE	<i>Scadoxus puniceus</i> (L.) Friis & Nordal	PNCO: Protected	Snake Lily	Perennial	Geophyte, herb
ANACARDIACEAE	<i>Searsia crenata</i> (Thunb.) Moffett	LC	Dune Crowberry	[No lifecycle defined]	Shrub, tree
ANACARDIACEAE	<i>Searsia glauca</i> (Thunb.) Moffett	LC	Blue Kuni-bush	Perennial	Shrub, tree
APIACEAE	<i>Alepidea peduncularis</i> A.Rich.	DDT		Perennial	Herb
APIACEAE	<i>Dasispermum suffruticosum</i> (P.J.Bergius) B.L.Burt	LC		Perennial	Herb
APOCYNACEAE	<i>Ceropegia carnososa</i> E.Mey.	PNCO: Endangered		Perennial	Climber, succulent
ASPARAGACEAE	<i>Asparagus intricatus</i> (Oberm.) Fellingham & N.L.Mey.	DDT		Perennial	Shrub
ASPHODELACEAE	<i>Haworthia cymbiformis</i> (Haw.) Duval var. <i>setulifera</i> (Poelln.) M.B.Bayer	DDT		Perennial	Herb, succulent
ASPHODELACEAE	<i>Aloe maculata</i> All.	LC	Common Soap Aloe	Perennial	Herb, succulent

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Family	Species	Threat status	Common Name	Lifecycle	Growth forms
ASPHODELACEAE	<i>Gasteria bicolor</i> Haw. var. <i>bicolor</i>	LC		Perennial	Succulent
ASPHODELACEAE	<i>Haworthia cooperi</i> Baker var. <i>pilifera</i> (Baker) M.B.Bayer	LC		Perennial	Succulent
ASPHODELACEAE	<i>Kniphofia linearifolia</i> Baker	LC	Common Marsh Poker	Perennial	Herb
ASPHODELACEAE	<i>Kniphofia rooperi</i> (T.Moore) Lem.	LC	Winter Poker	Perennial	Herb
ASPHODELACEAE	<i>Kniphofia uvaria</i> (L.) Oken	LC	Red-hot Poke	Perennial	Herb
ASTERACEAE	<i>Arctotheca populifolia</i> (P.J.Bergius) Norl.	LC	Sea Pumpkin	Perennial	Herb, succulent
ASTERACEAE	<i>Brachylaena discolor</i> DC.	LC	Coastal Silver-oak	Perennial	Shrub, tree
ASTERACEAE	<i>Brachylaena elliptica</i> (Thunb.) DC.	LC	Bitter-leaf Silver-oak	Perennial	Shrub, tree
ASTERACEAE	<i>Conyza obscura</i> DC.	LC		Perennial	Herb
ASTERACEAE	<i>Delairea odorata</i> Lem.	LC		Perennial	Climber, herb, succulent
ASTERACEAE	<i>Helichrysum anomalum</i> Less.	LC		Perennial	Dwarf shrub
ASTERACEAE	<i>Helichrysum herbaceum</i> (Andrews) Sweet	LC	Monkey-tail Everlasting	Perennial	Herb
ASTERACEAE	<i>Helichrysum miconiifolium</i> DC.	LC		Perennial	Herb
ASTERACEAE	<i>Helichrysum mixtum</i> (Kuntze) Moeser var. <i>mixtum</i>	LC		Perennial	Herb
ASTERACEAE	<i>Helichrysum odoratissimum</i> (L.) Sweet var. <i>odoratissimum</i>	LC	Hotnotskooigoed	Perennial	Herb, shrub
ASTERACEAE	<i>Helichrysum psilolepis</i> Harv.	LC		Perennial	Herb
ASTERACEAE	<i>Helichrysum spiralepis</i> Hilliard & B.L.Burtt	LC	Motsuoane-oa-metsi	Perennial	Herb
ASTERACEAE	<i>Othonna carnosa</i> Less. var. <i>carnosa</i>	LC		Perennial	Shrub, succulent
ASTERACEAE	<i>Senecio madagascariensis</i> Poir.	LC		Annual	Herb
ASTERACEAE	<i>Senecio speciosus</i> Willd.	LC	Ibohloholo	Perennial	Herb
ASTERACEAE	<i>Ageratum conyzoides</i>		Invader <i>Ageratum</i>		
BIGNONIACEAE	<i>Tecoma capensis</i>		Cape honey suckle		
BRASSICACEAE	<i>Heliophila macrosperma</i> Burch. ex DC.	DDT		Perennial	Shrub
CAMPANULACEAE	<i>Wahlenbergia stellarioides</i> Cham. & Schtdl.	LC		Annual	Herb

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Family	Species	Threat status	Common Name	Lifecycle	Growth forms
CAPPARACEAE	<i>Boscia oleoides (Burch. ex DC.) Toelken</i>	LC	Karoo Shepherd Tree	Perennial	Tree
CELASTRACEAE	<i>Maytenus acuminata (L.f.) Loes. var. acuminata</i>	LC	Silky Bark	Perennial	Shrub, tree
CELASTRACEAE	<i>Maytenus procumbens (L.f.) Loes.</i>	LC	Dune Koko Tree	Perennial	Dwarf shrub, shrub, tree
CELASTRACEAE	<i>Mystroxydon aethiopicum (Thunb.) Loes. subsp. aethiopicum</i>	LC	Cape Cherry	Perennial	Shrub, tree
CELASTRACEAE	<i>Pterocelastrus tricuspidatus (Lam.) Walp.</i>	LC		Perennial	Shrub, tree
COLCHICACEAE	<i>Colchicum longipes (Baker) J.C.Manning & Vinn.</i>	LC		Perennial	Geophyte
CONVOLVULACEAE	<i>Convolvulus bidentatus Bernh. ex C.Krauss</i>	LC		Perennial	Climber, herb
CONVOLVULACEAE	<i>Falkia repens Thunb.</i>	LC	Oortjies	Perennial	Herb
CONVOLVULACEAE	<i>Ipomoea crassipes Hook. var. crassipes</i>	LC	Wildewinde	Perennial	Herb, succulent
CONVOLVULACEAE	<i>Convolvulus arvensis</i>		Wild morning glory		
CRASSULACEAE	<i>Crassula spathulata Thunb.</i>	LC		Perennial	Herb, succulent
CUCURBITACEAE	<i>Coccinia quinqueloba (Thunb.) Cogn.</i>	LC	Bobbejaankomkommer	Perennial	Climber, herb
CUCURBITACEAE	<i>Coccinia rehmannii Cogn.</i>	LC	Wild Cucumber	Perennial	Climber, herb, succulent
CYPERACEAE	<i>Bulbostylis scleropus C.B.Clarke</i>	LC		Perennial	Cyperoid, herb, mesophyte
CYPERACEAE	<i>Ficinia lateralis (Vahl) Kunth</i>	LC		Perennial	Cyperoid, herb, mesophyte
DIOSCOREACEAE	<i>Dioscorea cotinifolia Kunth</i>	LC	Wild Yam	Perennial	Climber, geophyte, succulent
DIPSACACEAE	<i>Scabiosa columbaria L.</i>	LC	Morning Bride	Perennial	Herb
EBENACEAE	<i>Euclea crispa (Thunb.) Gürke subsp. crispa</i>	LC	Blue Guarri	Perennial	Shrub, tree
EBENACEAE	<i>Euclea natalensis A.DC. subsp. natalensis</i>	LC	Hairy Guarri	Perennial	Shrub, tree
EBENACEAE	<i>Diospyros dichrophylla</i>		Poison star apple		
ERICACEAE	<i>Erica unilateralis Klotzsch ex Benth.</i>	PNCO: Protected		Perennial	Shrub
EUPHORBIACEAE	<i>Acalypha depressinerva (Kuntze) K.Schum.</i>	LC	Bearded-leaved Brooms and Brushes	Perennial	Dwarf shrub, herb

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EUPHORBIACEAE	<i>Acalypha ecklonii</i> Baill.	LC		Annual	Herb
EUPHORBIACEAE	<i>Acalypha glabrata</i> Thunb. var. <i>glabrata</i>	LC	Forest False Nettle	Perennial	Shrub, tree
EUPHORBIACEAE	<i>Adenocline acuta</i> (Thunb.) Baill.	LC		Annual (occ. perennial)	Herb
EUPHORBIACEAE	<i>Clutia monticola</i> S.Moore var. <i>monticola</i>	LC		Perennial	Dwarf shrub, herb
EUPHORBIACEAE	<i>Euphorbia grandidens</i> Haw.	LC	Valley-bush Euphorbia	Perennial	Shrub, succulent, tree
FABACEAE	<i>Chamaecrista capensis</i> (Thunb.) E.Mey. var. <i>flavescens</i> (Thunb.) E.Mey.	LC		Perennial	Herb
FABACEAE	<i>Dolichos hastaeformis</i> E.Mey.	LC		Perennial (occ. annual)	Herb
FABACEAE	<i>Eriosema squarrosum</i> (Thunb.) Walp.	LC		Perennial	Herb
FABACEAE	<i>Erythrina caffra</i> Thunb.	LC	Coastal Coral Tree	Perennial	Tree
FABACEAE	<i>Erythrina humeana</i> Spreng.	LC	Dwarf Coral Tree	Perennial	Shrub, tree
FABACEAE	<i>Lessertia stenoloba</i> E.Mey.	LC		Perennial	Herb
FABACEAE	<i>Lotononis stricta</i> (Eckl. & Zeyh.) B.-E.van Wyk	LC		Perennial	Dwarf shrub, shrub
FABACEAE	<i>Rhynchosia totta</i> (Thunb.) DC. var. <i>totta</i>	LC	Yellow Carpet Bean	Perennial	Climber, herb
FABACEAE	<i>Tephrosia capensis</i> (Jacq.) Pers. var. <i>capensis</i>	LC		Perennial	Dwarf shrub, herb, shrub
FABACEAE	<i>Acacia dealbata</i>		Silver wattle		
FABACEAE	<i>Acacia mearnsii</i>		Black wattle		
FABACEAE	<i>Acacia saligna</i>		Fort Jackson		
GENTIANACEAE	<i>Sebaea hymenosepala</i> Gilg	LC		Perennial	Herb
HYACINTHACEAE	<i>Albuca fastigiata</i> Dryand. var. <i>fastigiata</i>	LC	Umaphipha-intelezi	Perennial	Geophyte
HYACINTHACEAE	<i>Albuca namaquensis</i> Baker	LC	Growwetamarak	Perennial	Geophyte
HYACINTHACEAE	<i>Dipcadi brevifolium</i> (Thunb.) Fourc.	LC	Slangui	Perennial	Geophyte
HYACINTHACEAE	<i>Dipcadi ciliare</i> (Zeyh. ex Harv.) Baker	LC	Curly-curly	Perennial	Geophyte
HYACINTHACEAE	<i>Ledebouria undulata</i> (Jacq.) Jessop	LC		Perennial	Geophyte
HYACINTHACEAE	<i>Ornithogalum flexuosum</i> (Thunb.) U. & D.Müll.-Doblies	LC		Perennial	Geophyte
HYACINTHACEAE	<i>Eucomis comosa</i> (Houtt.) Wehrh. var. <i>comosa</i>	Not Evaluated	Pineapple Flower	Perennial	Geophyte
HYACINTHACEAE	<i>Ornithogalum tenuifolium</i> F.Delaroche subsp.	Not Evaluated		Perennial	Geophyte

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Family	Species	Threat status	Common Name	Lifecycle	Growth forms
	<i>tenuifolium</i>				
HYPOXIDACEAE	<i>Hypoxis hemerocallidea</i> Fisch., C.A.Mey. & Avé-Lall.	LC	Inkomfe	Perennial	Geophyte
IRIDACEAE	<i>Bobartia orientalis</i> J.B.Gillett subsp. <i>orientalis</i>	PNCO: Protected	Geelblombiesie	Perennial	Herb
IRIDACEAE	<i>Gladiolus ochroleucus</i> Baker	PNCO: Protected	Pypie	Perennial	Geophyte, herb
IRIDACEAE	<i>Gladiolus permeabilis</i> D.Delaroche subsp. <i>edulis</i> (Burch. ex Ker Gawl.) Oberm.	PNCO: Protected		Perennial	Geophyte, herb
IRIDACEAE	<i>Gladiolus wilsonii</i> (Baker) Goldblatt & J.C.Manning	PNCO: Protected		Perennial	Geophyte, herb
IRIDACEAE	<i>Moraea elliotii</i> Baker	PNCO: Protected		Perennial	Geophyte, herb
IRIDACEAE	<i>Tritonia gladiolaris</i> (Lam.) Goldblatt & J.C.Manning	PNCO: Protected	Pencilled Tritonia	[No lifecycle defined]	[No lifeform defined]
LAMIACEAE	<i>Clerodendrum glabrum</i> E.Mey.	LC	Smooth Tinderwood	Perennial	Shrub, tree
LAMIACEAE	<i>Stachys aethiopica</i> L.	LC	Wild Sage	Perennial	Herb
LAMIACEAE	<i>Leonotis leooris</i>		Wild dagga		
MALVACEAE	<i>Abutilon grantii</i> A.Meeuse	LC		Perennial	Shrub
MALVACEAE	<i>Dombeya cymosa</i> Harv.	LC	Hairless Dombeya	Perennial	Shrub, tree
MALVACEAE	<i>Dombeya tiliacea</i> (Endl.) Planch.	LC	Forest Dombeya	Perennial	Shrub, tree
MALVACEAE	<i>Hermannia flamma</i> Jacq.	LC	Poprosie	Perennial	Dwarf shrub
MALVACEAE	<i>Hibiscus calyphyllus</i> Cav.	LC	Pondoland Hibiscus	Perennial	Dwarf shrub, herb
MALVACEAE	<i>Hibiscus pedunculatus</i> L.f.	LC	Hibiscus pedunculatus	Perennial	Herb
MALVACEAE	<i>Hibiscus tiliaceus</i> L. subsp. <i>tiliaceus</i>	LC	Lagoon Hibiscus	Perennial	Shrub, tree
MALVACEAE	<i>Melhania didyma</i> Eckl. & Zeyh.	LC		Perennial	Dwarf shrub
MYRTACEAE	<i>Syzygium cordatum</i> Hochst. ex C.Krauss subsp. <i>cordatum</i>	LC	Water Berry	Perennial	Shrub, tree
ORCHIDACEAE	<i>Brownleea coerulea</i> Harv. ex Lindl.	PNCO: Protected		Perennial	Geophyte, herb
ORCHIDACEAE	<i>Habenaria dregeana</i> Lindl.	PNCO: Protected	Small Green Hood	Perennial	Geophyte, herb
ORCHIDACEAE	<i>Satyrium membranaceum</i> Sw.	PNCO: Protected		Perennial	Geophyte, herb
OROBANCHACEAE	<i>Hyobanche sanguinea</i> L.	LC	Jakkalsblom	Annual	Herb, parasite
OROBANCHACEAE	<i>Striga bilabiata</i> (Thunb.) Kuntze subsp. <i>bilabiata</i>	LC	Small Pink	Annual (occ.	Herb, parasite

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Family	Species	Threat status	Common Name	Lifecycle	Growth forms
			Witchweed	perennial)	
OROBANCHACEAE	<i>Striga gesnerioides</i> (Willd.) Vatke	LC	Purple Witchweed	Perennial	Herb, parasite
PHYLLANTHACEAE	<i>Phyllanthus maderaspatensis</i> L.	LC	Skilpadbossie	Annual (occ. perennial)	Herb
PLANTAGINACEAE	<i>Plantago crassifolia</i> Forssk. var. <i>crassifolia</i>	LC		Perennial	Dwarf shrub, herb
PLUMBAGINACEAE	<i>Limonium linifolium</i> (L.f.) Kuntze var. <i>maritimum</i> (Eckl. & Zeyh. ex Boiss.) R.A.Dyer	Not Evaluated		Perennial	Dwarf shrub
POACEAE	<i>Cymbopogon nardus</i> (L.) Rendle	LC	Giant Turpentine Grass	Perennial	Graminoid
POACEAE	<i>Digitaria eriantha</i> Steud.	LC	Woolly Finger Grass	Perennial	Graminoid
POACEAE	<i>Digitaria ternata</i> (A.Rich.) Stapf	LC	Black-seed Finger Grass	Perennial	Graminoid
POACEAE	<i>Eragrostis curvula</i> (Schrud.) Nees	LC	Berg-Soetgras	Annual	Graminoid
POACEAE	<i>Eragrostis heteromera</i> Stapf	LC		Perennial	Graminoid
POACEAE	<i>Eragrostis obtusa</i> Munro ex Ficalho & Hiern	LC	Kwaggakweek	Perennial	Graminoid
POACEAE	<i>Eustachys paspaloides</i> (Vahl) Lanza & Mattei	LC	Brown Rhodes Grass	Perennial	Graminoid
POACEAE	<i>Helictotrichon capense</i> Schweick.	LC		Perennial	Graminoid
POACEAE	<i>Hyparrhenia hirta</i> (L.) Stapf	LC	Thatch Grass	Perennial	Graminoid
POACEAE	<i>Leptochloa eleusine</i> (Nees) Cope & N.Snow	LC		Perennial	Graminoid
POACEAE	<i>Melica racemosa</i> Thunb.	LC	Haakgras	Perennial	Graminoid
POACEAE	<i>Pennisetum macrourum</i> Trin.	LC	Jaagbesem	Perennial	Graminoid
POACEAE	<i>Setaria sphacelata</i> (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss var. <i>sericea</i> (Stapf) Clayton	LC		Perennial	Graminoid
POACEAE	<i>Setaria sphacelata</i> (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss var. <i>torta</i> (Stapf) Clayton	LC	Small Creeping Foxtail	Perennial	Graminoid
POACEAE	<i>Sporobolus africanus</i> (Poir.) Robyns & Tournay	LC	Taipol	Perennial	Graminoid
POACEAE	<i>Sporobolus virginicus</i> (L.) Kunth	LC	Brakgras	Perennial	Graminoid
POACEAE	<i>Themeda triandra</i> Forssk.	LC	Rooigras	Perennial	Graminoid
POACEAE	<i>Tragus berteronianus</i> Schult.	LC	Small Carrot-Seed Grass	Perennial	Graminoid

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Family	Species	Threat status	Common Name	Lifecycle	Growth forms
POACEAE	<i>Cymbopogon pospischilii</i> (K.Schum.) C.E.Hubb.	Not Evaluated		Perennial	Graminoid
POACEAE	<i>Paspalum dilatatum</i> Poir.	Not Evaluated		Annual	Graminoid
POLYGALACEAE	<i>Muraltia alopecuroides</i> (L.) DC.	LC	Kleinboeldok	Perennial	Dwarf shrub, shrub
POLYGALACEAE	<i>Polygala gymnoclada</i> MacOwan	LC		Annual	Herb
POLYGALACEAE	<i>Polygala illepida</i> E.Mey. ex Harv.	LC		Annual	Herb
PRIMULACEAE	<i>Anagallis arvensis</i> L. subsp. <i>arvensis</i>	Not Evaluated		Annual	Herb
RUBIACEAE	<i>Coddia rudis</i> (E.Mey. ex Harv.) Verdc.	LC	Small Bone-apple	Perennial	Shrub
RUBIACEAE	<i>Conostomium natalense</i> (Hochst.) Bremek. var. <i>glabrum</i> Bremek.	LC		Perennial	Herb
RUBIACEAE	<i>Galopina circaeoides</i> Thunb.	LC		Perennial	Herb
SALICACEAE	<i>Dovyalis zeyheri</i> (Sond.) Warb.	LC	Apricot Sourberry	Perennial	Shrub, tree
SALICACEAE	<i>Scolopia zeyheri</i> (Nees) Harv.	LC	Thorn Pear	Perennial	Shrub, tree
SANTALACEAE	<i>Thesium junceum</i> Bernh. var. <i>junceum</i>	LC		Perennial	Herb, parasite, shrub
SANTALACEAE	<i>Thesium triflorum</i> Thunb. ex L.f.	LC	Gifbossie	Perennial	Climber, herb, parasite
SAPINDACEAE	<i>Deinbollia oblongifolia</i> (E.Mey. ex Arn.) Radlk.	LC	Dune Soap-berry	Perennial	Shrub, tree
SAPINDACEAE	<i>Pappea capensis</i> Eckl. & Zeyh.	LC	Jacket Plum	Perennial	Shrub, tree
SCROPHULARIACEAE	<i>Jamesbrittenia phlogiflora</i> (Benth.) Hilliard	LC		Perennial	Dwarf shrub
SCROPHULARIACEAE	<i>Nemesia fruticans</i> (Thunb.) Benth.	LC	Maagpynblommetjie	Perennial	Dwarf shrub, suffrutex
SCROPHULARIACEAE	<i>Selago cinerea</i> L.f.	LC		Perennial	Dwarf shrub, suffrutex
SOLANACEAE	<i>Solanum mauritianum</i>		Bugweed		
THYMELAEACEAE	<i>Gnidia nodiflora</i> Meisn.	LC		Perennial	Dwarf shrub, shrub
THYMELAEACEAE	<i>Passerina rigida</i> Wikstr.	LC	Dune Gonna	Perennial	Dwarf shrub, shrub
URTICACEAE	<i>Laportea peduncularis</i> (Wedd.) Chew subsp. <i>latidens</i> Friis	LC		Annual	Herb
VITACEAE	<i>Rhoicissus tomentosa</i> (Lam.) Wild & R.B.Drumm.	LC	Common Forest Grape	Perennial	Climber
ZAMIACEAE	<i>Encephalartos altensteinii</i> Lehm.	PNCO:	Giant Eastern Cape	Perennial	Tree

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Family	Species	Threat status	Common Name	Lifecycle	Growth forms
		Endangered; NEMBA (Vulnerable)	Cycad		