ECOLOGICAL BASELINE ASSESSMENT

Proposed Mixed-use Development
On Re Erf 513, Napier

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Date: November 2017

PROJECT DETAILS

	Title: Ecological Baseline Assessment Proposed Mixed-use Development On Re Erf 513, Napier	
Eco Impact No: Napier111/2017	**Date:** November 2017	**Report Status:** Final
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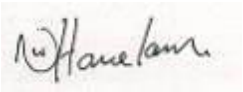
By Author	Director: Environmental Management; Principle Environmental Assessment Practitioner & Biodiversity Specialist	Nicolaas Hanekom		3 November 2017

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Executive Summary

The Cape Agulhas Municipality proposes to establish a mixed-use development on the Remaining Extent of Erf 513 east of the existing Nuwerus residential area in Napier to address the housing backlog and provide IRDP housing, GAP housing, amenities, parks and other services for the local community.

Eco Impact has been appointed to conduct an ecological baseline assessment on the broader ±7.8ha site to assess the ecological state of the proposed development site, identify potential constraints, assess the potential impact of the proposed activities on the ecological features of the site and surrounds and provide associated mitigation and management recommendations.

The study site is gradually undulating with the highest point being approximately in the middle of the site and then sloping down to the north and south. The whole site has been completely transformed mainly due to previous cultivation and thereafter due to ongoing urban development and ongoing human impact. Numerous formal and informal gravel footpaths and vehicle roads exist throughout the site and waste (especially garden waste) is dumped on site. Transformed non-perennial drainage lines are present along the northern and southern borders of the site. The site is bordered by high to medium density residential development to the north, east and west; and cultivated agricultural land to the south.

The indigenous vegetation type originally occurring on the site and surrounds is *Critically Endangered* Elim Ferricrete Fynbos. According to the 2017 Western Cape Biodiversity Spatial Plan no remaining terrestrial or aquatic Critical Biodiversity Areas (CBAs) are mapped on the site. Minimal (less than 0.5ha in total) remaining non-viable indigenous vegetation species populations were recorded on site and no species of conservation concern were recorded nor are expected to occur on the site.

The vegetation on the site is completely dominated by grass species, weeds and weedy herbs associated with cultivated lands. A row of planted *Pinus pinaster* trees is located along the south-eastern edge of the site. Scattered *Acacia saligna* trees are present throughout the site although the only dense stand is located within the northern part of the site. Scattered Eucalyptus trees are also present along the completely transformed and channelled non-perennial drainage line located within the northern part of the site.

The non-perennial drainage line within the cultivated agricultural land along the southern border of the site falls outside the study site and has been classified as a natural NFEPA Wetland, but an associated “Ecological Support Area 2: Restore buffer area” has been mapped for the drainage line and a section thereof falls within the southern part of the site. It is recommended that no development occurs within this drainage line nor its associated ESA2:Restore buffer area.

The completely transformed and channelled non-perennial drainage line within the northern part of the site has been transformed to such an extent that it is not possible to determine the original extent or the flow path location. At certain sections within this drainage line it has been completely filled to create a vehicle or footpath crossing and the average width of the channel within the study area is approximately 1m wide. It is recommended that this drainage line be

formalised to prevent potential future flooding of surrounding developments and to ensure ongoing free flow within the drainage line when it is flowing. The 1:100 year flow must be calculated and then used to determine the most suitable storm water structures that must be established within this drainage line to accommodate this flow. If financially possible, it is recommended that "landscape friendly" engineering structures are incorporated into the formalisation of this drainage line so that this drainage line can become an important and attractive aesthetic feature as part of the proposed development.

The botanical sensitivity allocated to the site is low, as well as the overall conservation value of the site except for the non-perennial drainage line and its associated ESA2 buffer area south of the site which has been allocated a high conservation value and not recommended for development. If the recommendations as provided in this report are incorporated into the proposed development layout and implemented during the associated construction-, operational-, and decommissioning phases it will have an overall low negative ecological impact.

It was concluded that, from an ecological impact point of view, the proposed development should not have an unacceptably significant negative impact on environmental features of the site and surrounds if specialist recommendations are taken into consideration and effectively implemented.

1. Background & Competency

This ecological baseline assessment is presented by Eco Impact Legal Consulting (Pty) Ltd ("Eco Impact").

Eco Impact has been appointed as the independent ecological impact assessment specialist for this project.

Eco Impact is independent and does not have any interest in the business nor receive any payment other than fair remuneration for services rendered as required in terms of the regulations.

Johmandie Pienaar of Eco Impact holds a Baccalaureus Technologiae Degree (cum laude) in Nature Conservation from the Cape Peninsula University of Technology (2008).

She has completed the following short courses at the Centre for Environmental Management;

- Implementing Environmental Management Systems (ISO 14001)(2009);
- Occupational Health and Safety Law for Managers (2010);
- Implementing an OHS Management System based on OHSAS 18001 (2010)
- Occupational Health and Safety Management System OHSAS 18001 Audit: A Lead Auditor Course Based on ISO 19011 and ISO 17021 (2011).

Johmandie has trained as an Environmental Assessment Practitioner since March 2009 and has been involved in the compilation, coordination and management of Basic Assessment Reports, Environmental Impact Assessments, Environmental Management Programmes, Waste Licence Applications, Water Use Licence Applications, Rehabilitation Plans and

Baseline Biodiversity and Freshwater Ecosystems Surveys for numerous clients.

Nicolaas Hanekom has 26 years' experience working as an ecologist for nature conservation organizations. He has extensive field experience and botanical knowledge, some knowledge of wetlands ecology, is knowledgeable of the region in which they are working and exercises sound and unbiased scientific and professional judgment. He is a qualified Environmental Assessment Practitioner and a registered Professional Natural Scientist (Ecologist) with the SACNASP who holds a M. Tech, Nature Conservation from the Cape Peninsula University of Technology. This master's thesis focussed on the impact of different land uses on the Phytodiversity ("Botany/ plants") of the West Coast Strandveld in and around Rocherpan Nature Reserve.

Nicolaas further qualified in Environmental Management Systems ISO 14001:2004, at the Centre for Environmental Management, North-West University, as well as Environmental Management Systems ISO 14001:2004 Audit: Internal Auditors Course to ISO 19011:2011 level, from the Centre for Environmental Management, North-West University qualifying him to audit to ISO/SANS environmental compliance and EMS standards.

He has also completed the suite of Greener Governance courses with certificates in:

- An Overview of Environmental Management at the Local Government Level, Centre for Environmental Management, North-West University;
- Greener Governance for Local Authorities, Centre for Environmental Management, North-West University;
- Tools for Integrated Environmental Management and Governance, Centre for Environmental Management, North-West University.

He attended and obtained a certificate on Integrated Protected Area Planning at the Centre for Environmental Development, University of KwaZulu Natal and a certificate in Project Management (Theory and Practical), through CS Holdings. He has lectured in two subjects at the Cape Peninsula University of Technology. He has 26 years of environmental planning experience, working for Free State and Western Cape departments of environmental affairs, where he reviewed and commented on development (EIA) applications in the West Coast region.

Nicolaas has been responsible for many environmental impact assessments and several EIA applications, waste license and atmospheric emission license applications as well as being involved in the implementation of several environmental management systems.

2. Conditions Relating to this Report

The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. Eco Impact and its staff reserve the right to modify aspects of the report including the recommendations if and when new information may become available from on-going research or further work in this field, as pertaining to this investigation.

This report may not be altered or added to without the prior written consent of the author. This

restraint also refers to electronic copies of this report which are supplied as sub portion of other reports, including main reports. Similarly, any recommendations, statements, or conclusions drawn from or based on this report must specifically refer to this report. If such comments form part of a main report for this investigation, the base line report must be included in its entirety as an appendix or separate section to the main report.

3. Scope and Terms of Reference for the Study

Eco Impact Legal Consulting (Pty) Ltd was appointed to conduct an ecological baseline assessment to identify and assess potential impacts that proposed activities may have on any significant terrestrial or aquatic ecosystems of the applicable site and surrounds.

The basic terms of reference (TOR) for this study were the Cape Nature recommended TOR for biodiversity specialists, and are as follows:

- Produce a baseline analysis of the botanical attributes of the study area as a whole.

- This report should clearly indicate any constraints that would need to be taken into account in considering the development proposals further.

- The baseline report must include a map of the identified sensitive areas as well as indications of important constraints on the property. It must also:

- Describe the broad ecological characteristics of the site and its surrounds in terms of any mapped spatial components of ecological processes and/or patchiness, patch size, relative isolation of patches, connectivity, corridors, disturbance regimes, ecotones, buffering viability etc.

- In terms of biodiversity pattern, identify or describe:

  Community and ecosystem level
  - The main vegetation type, its aerial extent and interaction with neighbouring types, soil or topography;
  - The types of plant communities that occur in the vicinity of the site
  - Threatened or vulnerable ecosystems (*cf. SA vegetation map/National Spatial Biodiversity Assessment, etc.*)

  Species level
  - Red Data Book species of conservation concern (RDBSCC) - (provide location)
  - The viability of and estimated population size of the RDBSCC that are present (include degree of confidence in prediction based on availability of information and specialist knowledge, i.e. High = 70-100% confident, Medium 40-70% confident, Low 0-40% confident)
  - The likelihood of other RDBSCC species occurring within the vicinity (include degree of confidence)

  Other pattern issues
  - Any significant landscape features or rare or important vegetation associations

such as seasonal wetlands, alluvium, seeps, quartz patches or salt marshes in the vicinity.
    - The extent of alien plant cover of the site, and whether the infestation is the result of prior soil disturbance such as ploughing or quarrying
    - The condition of the site in terms of current or previous land uses

- In terms of biodiversity process, identify or describe:
    - The key ecological “drivers” of ecosystems on the site and in the vicinity, such as fire.
    - Any mapped spatial component of an ecological process that may occur at the site or in the vicinity i.e. watercourses, biome boundaries, migration routes etc.
    - Any possible changes in key processes e.g. increase fire frequency or drainage/artificial recharge of aquatic systems.

- Describe what is the significance of the potential impact of the proposed project – with and without mitigation – on biodiversity pattern and process at the site, landscape, and regional scales.

- Recommend actions that should be taken to prevent or mitigate impacts. Indicated how these should be scheduled to ensure long-term protection, management and restoration of affected ecosystems and biodiversity.

- Indicate limitations and assumptions, particularly in relation to seasonality.

4. Limitations, Assumptions and Methodology

The ±7.8ha site was surveyed during the morning of 20 October 2017.

The natural vegetation areas and any other prominent environmental features such as watercourses i.e. wetlands, drainage lines etc. if present were delineated and prominent indigenous and alien invasive species were recorded.

Characteristic plant species (if present on the proposed development site) were recorded during the survey as well as any rare, threatened or species of conservation concern or habitats. The GIS based South African National Biodiversity Institute (SANBI) vegetation map for South Africa (Mucina and Rutherford 2010) was consulted, along with the available regional conservation plans (CAPE), and the Western Cape Biodiversity Spatial Plan (2017), and a conclusion was drawn based on this documentation and professional experience in the area. SANBI – Red List of South African Plants website was also referred to if required.

One of the primary assumptions of this study is that sufficient botanical and ecosystem characteristics information could be gathered during the visit to make accurate conclusions regarding the conservation value of the area and potential impact of the development as proposed. Habitats (type, quality, rarity, characteristics) rather than species are used to inform mapping and decision making in this case. If sufficient botanical and/or ecosystem characteristics information could not be gathered during the initial site visit recommendations will be made to ensure adequate assessments are undertaken.

Due to the time of year, small area and current state of the site it is believed that sufficient ecosystem characteristics information could be gathered during the survey to conduct the assessment.

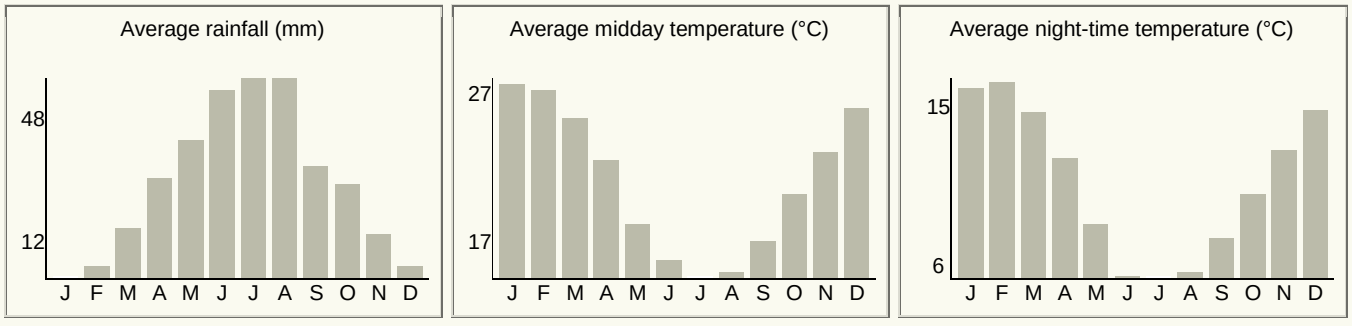
5. Broad Ecological Characteristics of the Site and Surrounds

5.1 Topography

The study site is gradually undulating with the highest point being 165m above mean sea level approximately in the middle of the site and then sloping down to the north and south, the lowest point being 132m in the northern part and 156m in the southern part.

5.2 Climate

Napier normally receives about 351mm of rain per year and because it receives most of its rainfall during winter it has a Mediterranean climate. The chart below (lower left) shows the average rainfall values for Napier per month. It receives the lowest rainfall (12mm) in January and the highest (48mm) in July. The monthly distribution of average daily maximum temperatures (centre chart below) shows that the average midday temperatures for Napier range from 17°C in July to 26.7°C in January. The region is the coldest during July when the mercury drops to 6°C on average during the night. Consult the chart below (lower right) for an indication of the monthly variation of average minimum daily temperatures.



5.3 Geology

Glenrosa and/or Mispah forms (other soils may occur), lime rare or absent in upland soils but generally present in low-lying soil. Mainly shale of the Bokkeveld Group. Soils with minimal development, usually shallow on hard or weathering rock, with or without intermittent diverse soils. Lime generally present in part or most of the landscape (ENTAP – Soil Description for the Western Cape)

5.4 Vegetation at a Regional and National Context

The study area is part of the fynbos biome, located within what is now known as the Core Region of the Greater Cape Floristic Region (GCFR; Manning & Goldblatt 2012). The GCFR is one of only six Floristic Regions in the world, and is the only one largely confined to a single country (the Succulent Karoo component extends into southern Namibia). It is also by far the

smallest floristic region, occupying only 0.2% of the world's land surface, and supporting about 11500 plant species, over half of all the plant species in South Africa (on 12% of the land area). At least 70% of all the species in the Cape region do not occur elsewhere, and many have very small home ranges (these are known as narrow endemics).

Many of the lowland habitats are under pressure from agriculture, urbanisation and alien plants, and thus many of the range restricted species are also under severe threat of extinction, as habitat is reduced to extremely small fragments. Data from the nationwide plant Red Listing project indicate that 67% of the threatened plant species in the country occur only in the southwestern Cape, and these total over 1800 species (Raimondo *et al* 2009). It should thus be clear that the southwestern Cape is a major national and global conservation priority, and is quite unlike anywhere else in the country in terms of the number of threatened plant species.

The study area lies within the Southwest Fynbos bioregion (Mucina & Rutherford 2006). The Southwest Fynbos bioregion has fertile soils, and is species rich, and has many threatened plant species.

The Western Cape Biodiversity Spatial Plan (2017) indicates identified Critical Biodiversity Areas (CBAs) which aims to guide sustainable development by providing a synthesis of biodiversity information to decision makers. It serves as the common reference for all multi-sectoral planning procedures, advising which areas can be lost to development, and which areas of critical biodiversity value and their support zones should be protected against any impacts.

The CBAs as mapped for the relevant area are shown on Map 3. The indigenous vegetation type originally occurring on the site and surrounds is *Critically Endangered* Elim Ferricrete Fynbos. According to the 2017 Western Cape Biodiversity Spatial Plan no remaining terrestrial or aquatic Critical Biodiversity Areas (CBAs) are mapped on the site. Minimal (less than 0.5ha in total) remaining non-viable indigenous vegetation species populations were recorded on site and no species of conservation concern were recorded nor are expected to occur on the site.

The vegetation on the site is completely dominated by grass species, weeds and weedy herbs associated with cultivated lands. A row of planted *Pinus pinaster* trees is located along the south-eastern edge of the site. Scattered *Acacia saligna* trees are present throughout the site although the only dense stand is located within the northern part of the site. Scattered Eucalyptus trees are also present along the completely transformed and channelled non-perennial drainage line located within the northern part of the site.

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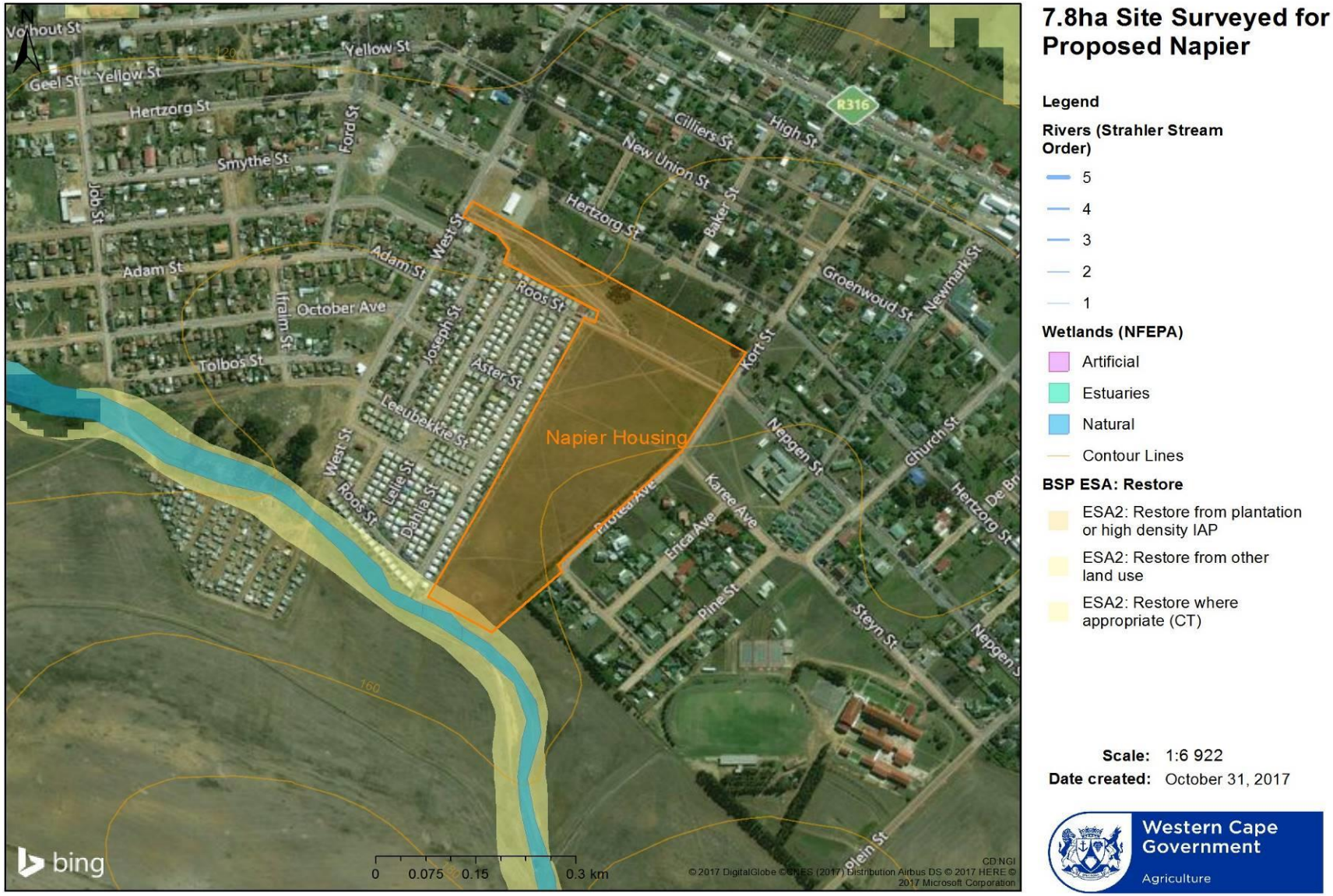
See study area maps below and site photographs attached as Appendix D.

Map 1: Napier locality in the Western Cape.

Map 2: Indicating locality of the 7.8ha surveyed site at Napier



Map 3: Critical Biodiversity Areas, Ecological Support Areas and NFEPA Wetlands according to the WCBSP (2017) mapping.

6. Observations and Findings Relative to the Terms of Reference

6.1 In terms of biodiversity pattern, identify or describe, at a community and ecosystem level-

6.1.1 The main vegetation type and plant communities that occur on, and in the vicinity of the site:

The National Vegetation Map of South Africa (2012) identifies the remnants of natural vegetation occurring within the area as *Critically Endangered* Elim Ferricrete Fynbos as part of the fynbos biome.

FFf1 Elim Ferricrete Fynbos-

Listed under Criterion: A1
Biome: Fynbos
Province: Western Cape
Municipalities: Theewaterskloof LM, Overstrand LM, Cape Agulhas LM and WCDMA03
Original area of ecosystem: 67 000ha
Remaining natural area of ecosystem (%): 29%
Proportion of ecosystem protected: 5% of original area
Known number of species of special concern: 72 Red Data plant species (EX, EW, CR, EN & VU excl VU D2) and 29 endemic plant species

Geographical location:
Extensive areas between the Bot River Valley, Hemel en Aarde Valley, Stanford environs, Salmonsdam and Baardskeerdersbos, with the most extensive parts around Elim on the Agulhas Plain spanning the area from Soetmuisberg in the north to Buffeljags and the Soetanysberg in the south. Outliers found on the northern slopes of the mountains adjacent to those of the Ruens around Napier and at Perdekamp north of Arniston.

Description:
Undulating hills and plains covered with open to closed dwarf shrubland with occasional scattered tall shrubs. It is a diverse ecosystem, with all structural fynbos types present, but with extensive areas of asteraceous fynbos dominated by low proteoid elements. To differentiate mesotrophic asteraceous from mesotrophic proteoid fynbos the following proteoid types are recognised: *Leucadendron elimense, L. laxum, L. modestum, L. stelligerum* and *L. teretifolium*. When degraded, this ecosystem becomes dominated by *Elytropappus rhinocerotis*. On transitions to deep sandy soils, *Protea repens* may be dominant, and these transitional communities are often much richer in species than associated Overberg Sandstone Fynbos (FFs 12). At least 29 endemic plant species and 72 Red Data List plant species occur in the ecosystem.

Observations and Findings within the Study Site:

The following indigenous vegetation species were recorded on the 7.8ha area during the

survey –

- *Aristida junciformis subsp junciformis*
- *Albuca maxima*
- *Elytropappus rhinocerotis*
- *Carpobrotus edulis*
- *Ornithogalum thyrsoides*
- *Gazania pectinata*
- *Helichrysum pandurifolium*
- *Metalasia muricata*
- *Pelargonium elongatum*
- *Chrysocoma ciliata*
- *Oedera genistifolia*

Alien Trees, Weeds and Grasses-

- *Acacia saligna* (Port Jackson)
- *Pinus pinaster*
- *Eucalyptus sp.*
- *Echium plantagineum* (Patterson's Curse)
- *Briza minor*
- *Avena fatua*
- *Vulpia myuros*
- *Pennisetum clandestium*
- *Ipomoea purpurea*
- *Brassica sp.* (Wild Mustard)
- *Aregemone sp.*
- *Sorghum halepense*
- *Lupinus sp.*

Minimal (less than 0.5ha in total) remaining non-viable indigenous vegetation species populations were recorded on site and no species of conservation concern were recorded nor are expected to occur on the site. For most of the indigenous vegetation species recorded on site less than 10 individuals of that species remained scattered throughout the site.

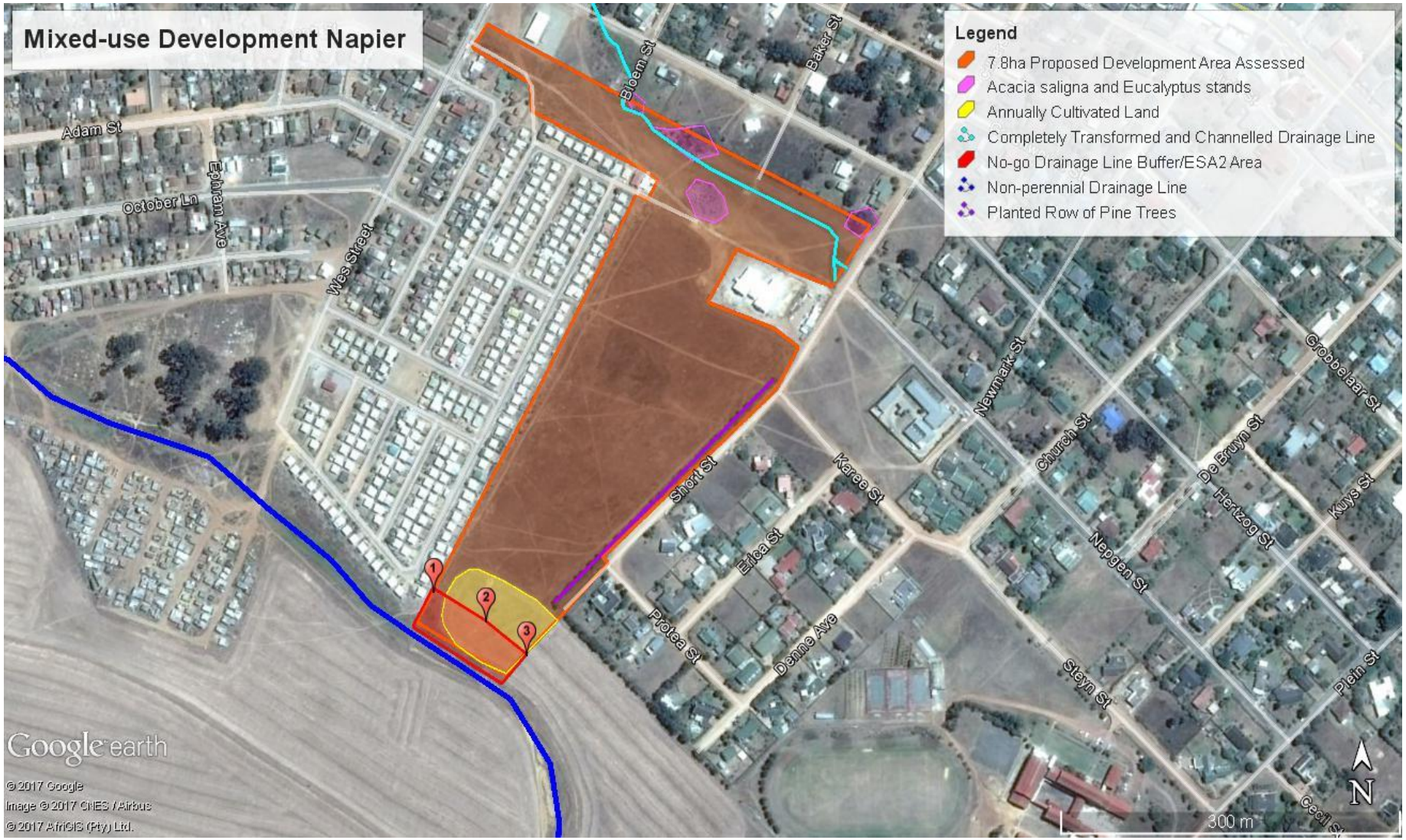
The vegetation on the site is completely dominated by grass species, weeds and weedy herbs associated with cultivated lands. A row of planted Pinus pinaster trees is located along the south-eastern edge of the site. Scattered Acacia saligna trees are present throughout the site although the only dense stand is located within the northern part of the site. Scattered Eucalyptus trees are also present along the completely transformed and channelled non-perennial drainage line located within the northern part of the site.

The botanical sensitivity allocated to the site is low, as well as the overall conservation value of the site except for the non-perennial drainage line and its associated ESA2 buffer area south of the site which has been allocated a high conservation value and recommended not to be developed upon. If the recommendations as provided in this report

are incorporated into the proposed development layout and implemented during the associated construction-, operational-, and decommissioning phases it will have an overall low negative ecological impact.

A **botanical sensitivity and overall low conservation value** has been allocated to the study site, because it is completely transformed, previously cultivated and/or cleared land, dominated by grass and weedy herb species. It supports less than 10% of the expected original indigenous plant diversity, no Plant Species of Conservation Concern are present and it is isolated because it is surrounded by existing urban developments and cultivated agricultural land.

From a botanical point of view development of the study site should therefore not have any significant detrimental impact on sensitive botanical habitats or on any plant species of conservation concern.



Map 4: This map indicates (amongst others) the Low Botanical Sensitivity proposed development area; the recommended no-go/no-development drainage line ESA2 buffer area and points 1, 2 and 3 the locations of the co-ordinates for the proposed no-go/no-development line.

No–go Drainage Line ESA2 Buffer Area points 1-3 GPS co-ordinates:

1. 34° 28’ 36.94’’S 19° 53’ 28.59’’E
2. 34° 28’ 37.84’’S 19° 53’ 30.46’’E
3. 34° 28’ 38.87”S 19° 53’ 31.88”E

6.1.2 Threatened or vulnerable ecosystems:

The CBAs as mapped for the relevant area are shown on Map 3. The indigenous vegetation type originally occurring on the site and surrounds is *Critically Endangered* Elim Ferricrete Fynbos. According to the 2017 Western Cape Biodiversity Spatial Plan no remaining terrestrial or aquatic Critical Biodiversity Areas (CBAs) are mapped on the site. Minimal (less than 0.5ha in total) remaining non-viable indigenous vegetation species populations were recorded on site and no species of conservation concern were recorded nor are expected to occur on the site.

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6.1.3 The types of animal communities (fish, invertebrates, avifauna, mammals, reptiles):

Fish

No fish species are present on the site or within close proximity to the site. The freshwater ecosystems within the area are mainly non-perennial drainage lines characteristics.

Invertebrates

Observations and Findings:

It is expected that the area has a rich and diverse invertebrate life especially within the remaining drainage line areas and surrounds. The proposed development, if restricted to recommended development area, will however not have a significant detrimental impact on the invertebrate species within the area.

Birds (Avifauna)

Approximately 164 species are known to occur in the bigger area (Hockey et al 2006).

Observations and Findings:

No bird species of conservation concern ("SCC") or their associated habitats were

observed on the proposed development site at the time of the survey.

If recommendations as provided in this report are adhered to it is not expected that the proposed will have a significant detrimental impact on any bird SCC or their habitat.

Mammals

As reported in Smithers (1983) small buck e.g. common duiker, steenbok and grysbok, bushbuck, rodents such as mole rats, field mice and hares, as well as carnivores such as genets, mongoose and caracal are likely to inhabit the area.

Some 70 mammal species are known to occur in the bigger area (Smithers 1983).

Observations and Findings:

Evidence of mole activities was observed on site.

No mammal SCC or their associated habitats were observed on the proposed development area at the time of the survey and due to the location and ongoing human impacts on this site it is not expected that any mammal SCC breeds or depends on this site.

If recommendations as provided in this report are adhered to it is not expected that the proposed development will have a significant detrimental impact on any mammal SCC concern or their habitat.

Amphibians and Reptiles (Herpetofauna)

With respect to amphibians, Minter et al (2004) state that “habitat loss or modification as a result of agriculture and other forms of human activity remains the most important single threat to the survival of amphibian populations. The scale of these changes and their relative permanence are the major cause. At greatest risk are species that have limited distributions.”

As reported in Alexander et al (2007) 26 reptile species and 7 amphibian species potentially occurs within the study area and surrounds.

Observations and Findings:

No amphibian or reptile species were observed during the time of the survey on the proposed development site.

If recommendations as provided in this report are adhered to it is not expected that the proposed development will have a significant detrimental impact on any amphibian or reptile SCC concern or their habitats.

6.2 In terms of biodiversity pattern, identify or describe, at species level-

(Show the degree of confidence in predictions based on the availability of information and specialist knowledge, i.e. High 70 -100% confident, Medium 40 - 70% confident, Low 0 - 40% confident. Assess the likelihood of other RDB species, or species of conservation concern, occurring in the vicinity. Reflect this in degree of confidence indicator).

6.2.1 The viability of, and estimated population size of the TOPS and RDB species of conservation concern that are present.

Red Data Listed or species listed under TOPS regulation (Vegetation)

No indigenous vegetation species of conservation concern remain on the proposed development site.

Red Data Listed or species listed under TOPS regulation (Reptiles and Amphibians)

No amphibian or reptile SCC is known to occur on the proposed development area and no rare or localized species were recorded at the time of the survey.

Red Data Listed or species listed under TOPS regulation (Mammals)

No mammal SCC is known to occur on the proposed development area and no rare or localized species were recorded at the time of the survey.

Red Data Listed or species listed under TOPS regulation (Avifauna)

No bird SCC is known to occur on the proposed development area and no rare or localized species were recorded at the time of the survey.

6.3 Other pattern issues-

Any significant landscape features or rare or important vegetation/faunal associations such as seasonal wetlands, alluvium, seeps, quartz patches or salt marshes in the vicinity:

As previously mentioned the non-perennial drainage line within the cultivated agricultural land along the southern border of the site falls outside the study site and has been classified as a natural NFEPA Wetland, but an associated Ecological Support Area 2: Restore buffer area has been mapped for the drainage line and a section thereof falls within the southern part of the site. It is recommended that no development should occur within this drainage line or its associated ESA2: Restore buffer area.

The completely transformed and channelled non-perennial drainage line within the northern parts of the site has been transformed to such an extent that it is not possible to determine the original extent or the flow path location. At certain sections within this drainage line it has been completely filled to create a vehicle or footpath crossing and the average width of the channel within the study area is approximately 1m wide. It is recommended that this drainage line be formalised to prevent potential future flooding of surrounding developments and ensure

ongoing free flow within the drainage line when it is flowing. The 1:100 year flow must be calculated and then used to determine the most suitable storm water structures that must be established within this drainage line to accommodate this flow. If financially possible, it is recommended that "landscape friendly" engineering structures are incorporated into the formalisation of this drainage line so that this drainage line can become an important and attractive aesthetic feature as part of the proposed development.

The botanical sensitivity allocated to the site is low, as well as the overall conservation value of the site except for the non-perennial drainage line and its associated ESA2 buffer area south of the site which has been allocated a high conservation value and recommended not to be developed upon. If the recommendations as provided in this report are incorporated into the proposed development layout and implemented during the associated construction-, operational-, and decommissioning phases it will have an overall low negative ecological impact.

6.4 The extent of alien plant cover on the site:

The vegetation on the site is completely dominated by grass species, weeds and weedy herbs associated with cultivated lands. A row of planted Pinus pinaster trees is located along the south-eastern edge of the site. Scattered Acacia saligna trees are present throughout the site although the only dense stand is located within the northern part of the site. Scattered Eucalyptus trees are also present along the completely transformed and channelled non-perennial drainage line located within the northern part of the site.

6.5 The condition of the site/s in terms of current or previous land uses:

The whole site has been completely transformed mainly due to previous cultivation and thereafter due to ongoing urban development and ongoing human impacts. Numerous formal and informal gravel footpaths and vehicle roads exist throughout the site and waste (especially garden waste) is dumped on site. Transformed non-perennial drainage lines are present along the northern and southern borders of the site. The site is bordered by high to medium density residential development to the north, east and west; and cultivated agricultural land to the south.

6.6 In terms of biodiversity process, identify or describe:

6.6.1. The key ecological "drivers" and/or environmental gradients of ecosystems on the site and in the vicinity.

Key ecological drivers identified on the site and surrounds are the non-perennial drainage lines although both of these drainage lines have been transformed and feed into a degraded catchment area, significantly impacted upon by especially cultivation and urban development.

6.6.2 Any possible changes in key processes e.g. increased fire frequency or drainage/artificial recharge of aquatic systems.

If the proposed development and associated hardening of surfaces are to take place it will lead to an increase in storm water run-off and artificial recharge of aquatic systems.

The necessary storm water management measures must be put in place to prevent any potential detrimental impacts on the applicable drainage lines.

6.6.3 The condition and functioning of rivers and wetlands (if present) in terms of possible changes to the channel, flow regime and naturally-occurring riparian vegetation.

As previously mentioned the non-perennial drainage line within the cultivated agricultural land along the southern border of the site falls outside the study site and has been classified as a natural NFEPA Wetland, but an associated Ecological Support Area 2: Restore buffer area has been mapped for the drainage line and a section thereof falls within the southern part of the site. It is recommended that no development should occur within this drainage line or its associated ESA2: Restore buffer area, which will prevent any potential impacts on the condition and functioning of this drainage line.

The completely transformed and channelled non-perennial drainage line within the northern parts of the site has been transformed to such an extent that it is not possible to either determine the original extent or the flow path location. At certain sections within this drainage line it has been completely filled to create a vehicle or footpath crossing and the average width of the channel within the study area is approximately 1m wide. It is recommended that this drainage line be formalised to prevent potential future flooding of surrounding developments and ensure ongoing free flow within the drainage line when it is flowing. The 1:100 year flow must be calculated and then used to determine the most suitable storm water structures that must be established within this drainage line to accommodate this flow. If financially possible, it is recommended that “landscape friendly” engineering structures are incorporated into the formalisation of this drainage line so that this drainage line can become an important and attractive aesthetic feature as part of the proposed development.

6.6.4 Would the conservation of the site lead to greater viability of the adjacent ecosystem by securing any of the functional factors listed?

No, and if the proposed recommendations as listed in this report are adhered to, the viability of the adjacent ecosystem should not be impacted upon negatively.

6.6.5 Does the site or neighbouring properties potentially contribute to meeting regional conservation targets for both biodiversity pattern and ecological processes?

Conservation of the hydrological functioning of the drainage lines will potentially contribute to meeting regional conservation targets.

6.6.6 Is this a potential candidate site for conservation stewardship?

No, the 7.8ha study site will not be a viable candidate for conservation stewardship due to its small size, current transformed state and isolation.

7. Ecological Impact Assessment with Associated Mitigation and Rehabilitation Measures to be implemented

(See Appendix B attached for Impact Assessment Methodology used)

Construction and Operational Phases:

Nature of potential impact:
Impact of proposed activities on indigenous vegetation and associated fauna and avifauna habitat

Discussion:
On the proposed development area of 7.8ha as assessed less than 0.5ha of scattered indigenous vegetation remains with no plant species of conservation concern, and the site is not expected to be an important breeding site or habitat for any fauna or avifauna species of conservation concern.

Cumulative impacts:
Loss of indigenous vegetation and associated fauna and avifauna habitat.

Mitigation:

- Clearly demarcate the southern boundary in-between the proposed development footprint area and the recommended no-go/no-development area and undertake construction and operational activities (including construction camp) only in demarcated development footprint area. Demarcation method to be approved by an Environmental Control Officer (ECO).
- No construction related disturbance should be allowed within the recommended southern no-go/no-development area. This includes no dumping of fill, no roads, and all forms of temporary disturbance.
- Implement site specific erosion and storm water runoff management measures to prevent (or if prevention is not possible limit) any erosion from occurring on the development footprint area and surrounds.
- The landowner/s must adhere to his/her legal obligations to actively eradicate and manage alien vegetation infestations present on the applicable and surrounding properties.

Criteria	**Without Mitigation**	**With Mitigation**
Extent	2	1
Duration	5	5
Magnitude	10	2
Probability	5	2
Significance	85 - High	16 - Low
Status	High Negative Significance without Mitigation	Low Negative Significance with Mitigation
Reversibility	100% Reversible	100% Reversible
Irreplaceable loss of resources	2-Partial loss of resources but can be rehabilitated	2 – Partial loss of resources
Degree to which impact can be mitigated	2 – Partly, some loss of indigenous vegetation will occur but will be limited to less than 0.5ha indigenous vegetation	

Nature of potential impact:
Impact of proposed development activities on surface- and groundwater resources

Discussion:
Construction activities can impact negatively upon the surface and groundwater resources on and adjacent to the site.

The non-perennial drainage line within the cultivated agricultural land along the southern border of the site falls outside the study site and has been classified as a natural NFEPA Wetland, but an associated Ecological Support Area 2: Restore buffer area has been mapped for the drainage line and a section thereof falls within the southern part of the site. It is recommended that no development should occur within this drainage line or its associated ESA2: Restore buffer area, which will prevent any potential impacts on the condition and functioning of this drainage line.

The completely transformed and channelled non-perennial drainage line within the northern parts of the site has been transformed to such an extent that it is not possible to neither determine the original extent nor flow path location. At certain sections within this drainage line it has been completely filled to create a vehicle or footpath crossing and the average width of the channel within the study area is approximately 1m wide. It is recommended that this drainage line be formalised to prevent potential future flooding of surrounding developments and ensure ongoing free flow within the drainage line when it is flowing. The 1:100 year flow must be calculated and then used to determine the most suitable storm water structures that must be established within this drainage line to accommodate this flow. If financially possible it is recommended that "landscape friendly" engineering structures are incorporated into the formalisation of this drainage line so that this drainage line can become an important and attractive aesthetic feature as part of the proposed development.

Possible chemicals found on site during construction as well as any hydrocarbon spillages will negatively affect the soil and surface or ground water interacting with it. Should the spills not be cleaned up and surface water infiltrate the ground, pollutants may even affect the groundwater resource.

Cumulative impacts:
Loss of fresh water habitat and pollution of surface water resources.

Mitigation:

- No development to be allowed within the ESA2 buffer area along the southern watercourse.
- The transformed northern drainage line must be formalised to accommodate the 1:100 year flood event and prevent potential future flooding of surrounding developments and ensure ongoing free flow within the drainage line when it is flowing.
- All construction activities and personnel on site to stay within demarcated construction areas.
- Proper waste bins to be provided to construction staff and all waste to be regularly removed to municipal landfill site.
- If any fuel or hazardous materials is spilled on site it must be treated as according to EMP hazardous spill management requirements.
- The cement mixing area must be at least 32m away from the edge of the watercourses and is only to take place within demarcated cement mixing area that is impermeable and has a berm so that no cement mix runoff water escapes from cement mixing area.

Criteria	**Without Mitigation**	**With Mitigation**
Extent	2	1
Duration	5	1
Magnitude	10	2
Probability	5	2
Significance	85 - High	8 - Low
Status	High Negative Significance without Mitigation	Low Negative Significance with Mitigation
Reversibility	100%	100%
Irreplaceable loss of	2-Partial loss of resources but can be rehabilitated	1 – Resource will not be lost

resources		
Degree to which impact can be mitigated	1- Completely	

Nature of potential impact: Potential erosion of the site and surrounds		
Discussion: Vegetation clearance and hardening of surfaces could lead to an increase in storm water runoff and eventually lead to soil erosion which can occur due to wind (wind erosion cause dust pollution); and due to overland storm water flow should heavy rains fall.		
Cumulative impacts: Exposing soil may lead to erosion of site and surrounds if not mitigated.		
Mitigation: • Site specific construction and operational phase storm water management plan must be compiled and implemented to prevent any erosion or significant increase in storm water runoff from occurring and artificially recharging the remaining drainage lines. • Should any signs of erosion or artificial recharge be observed the municipality must implemented rectification and preventions measures immediately and consult with the appointed ECO before implementing these measures.		
Criteria		
	Without Mitigation	**With Mitigation**
Extent	3	1
Duration	5	1
Magnitude	6	2
Probability	4	2
Significance	56 - Medium	8 - Low
Status	Medium Negative Significance without Mitigation	Low Negative Significance with Mitigation
Reversibility	100%	100%
Irreplaceable loss of resources	2-Partial loss of resources but can be rehabilitated	1 – Resource will not be lost
Degree to which impact can be mitigated	1 – Can be completely mitigated	

Decommissioning/Rehabilitation Phase:

Nature of potential impact: Potential erosion of the site and surrounds during rehabilitation phase
Discussion: Decommissioning (i.e. demolishing developed structures) could lead to soil erosion which can occur due to wind (wind erosion cause dust pollution); and due to overland storm water flow should heavy rains fall.
Cumulative impacts: Exposing soil may lead to erosion of site and surrounds if not mitigated.
Mitigation: • Decommissioned areas must be rehabilitated and planted with indigenous vegetation immediately after built structures have been removed.

- Engineered contour structures reinstated and maintained.
- Monitor rehabilitation of area on a 6 monthly basis until effective/successful rehabilitation has been obtained.
- If erosion is detected implement erosion rectification and preventions measures as guided by an ECO

Criteria		
	Without Mitigation	**With Mitigation**
Extent	3	1
Duration	5	1
Magnitude	6	2
Probability	4	2
Significance	56 - Medium	8 - Low
Status	Medium Negative	Low Negative (Acceptable)
Reversibility	100%	100%
Irreplaceable loss of resources	2-Partial loss of resources but can be rehabilitated	1 – Resource will not be lost
Degree to which impact can be mitigated	1 – Can be completely mitigated	

8. Concluding Remarks and Summary of Impact Mitigation and Rehabilitation Measures Proposed before, during and after the Proposed Activities

The botanical sensitivity allocated to the site is low, as well as the overall conservation value of the site except for the non-perennial drainage line and its associated ESA2 buffer area south of the site which has been allocated a high conservation value and recommended not to be developed upon. If the recommendations as provided in this report are incorporated into the proposed development layout and implemented during the associated construction-, operational-, and decommissioning phases it will have an overall low negative ecological impact.

It was concluded that from an ecological impact point of view that the proposed development should not have an unacceptable significant negative impact on environmental features of the site and surrounds if specialist recommendations are taken into consideration and effectively implemented.

Summary of recommendations as listed in the report and additional recommendations to be implemented are listed below:

Planning considerations and constraints-

- The non-perennial drainage line within the cultivated agricultural land along the southern border of the site falls outside the study site and has been classified as a natural NFEPA Wetland, but an associated Ecological Support Area 2: Restore buffer area has been mapped for the drainage line and a section thereof falls within the southern part of the site. It is recommended that no development occur within this drainage line or its associated ESA2: Restore buffer area, which will prevent any potential impacts on the condition and functioning of this drainage line.

- The completely transformed and channelled non-perennial drainage line within the northern parts of the site has been transformed to such an extent that it is not possible to neither determine the original extent nor flow path location. At certain sections within this drainage line it has been completely filled to create a vehicle or footpath crossing and the average width of the channel within the study area is approximately 1m wide. It is recommended that this drainage line be formalised to prevent potential future flooding of surrounding developments and ensure ongoing free flow within the drainage line when it is flowing. The 1:100 year flow must be calculated and then used to determine the most suitable storm water structures that must be established within this drainage line to accommodate this flow. If financially possible it is recommended that "landscape friendly" engineering structures are incorporated into the formalisation of this drainage line so that this drainage line can become an important and attractive aesthetic feature as part of the proposed development.

Construction, Operational and Rehabilitation phases -

- The project implementation process should be subject to standard Environmental Management Programme (EMP) prescripts and conditions and only proceed under supervision of a competent and diligent Environmental Control Officer, both during the construction, operational and decommission/rehabilitation phases.
- Undertake development activities only in identified and specifically demarcated areas as proposed.
  - Demarcate no-go areas before any land clearing occurs under the supervision of an ECO. Demarcation must be clearly visible and effective and no-go area must remain demarcated throughout construction phase.
  - Personnel should be restricted to the construction camp site and immediate construction areas only.
  - Remove and conserve topsoil layer and overburden material for rehabilitation after construction activities have ceased
  - Implement site specific erosion and storm water runoff management measures as according to EMP requirements to prevent (or if prevention is not possible limit) any erosion from occurring on the development footprint area and surrounds.
  - Proper waste bins to be provided during construction and operation and all waste to be regularly (at least once a week) removed to municipal landfill site.
  - If any fuel or hazardous materials is spilled on site it must be treated as according to EMP requirements.
  - The cement mixing area must be at least 32m away from the edge of the watercourses and is only to take place within demarcated cement mixing area that is impermeable and has a berm so that no cement mix runoff water escapes from cement mixing area.
  - The landowner/s must adhere to his/her legal obligations to actively eradicate and manage alien tree infestations present on the applicable and surrounding properties.
  - Site specific construction and operational phase storm water management plan must be compiled and implemented to prevent any erosion or significant increase in storm water runoff from occurring and artificially recharging the remaining drainage lines.
  - Should any signs of erosion or artificial recharge be observed the municipality must implemented rectification and preventions measures immediately and consult with the appointed ECO before implementing these measures.

- Only use vegetation indigenous to the area to rehabilitate impacted/decommissioned areas and implement ongoing monitoring of the rehabilitated areas until successful rehabilitation has taken place.
- After topsoil has been replaced ongoing monitoring and removal of alien vegetation regrowth must be conducted to ensure effective rehabilitation of indigenous vegetation.
- Decommissioned areas must be rehabilitated and planted with indigenous vegetation immediately after built structures have been removed.
- Engineered contour structures reinstated and maintained.
- Monitor rehabilitation of areas impacted outside of the proposed development areas or decommissioned areas on a 6 monthly basis until effective/successful rehabilitation has been obtained.
- If erosion is detected during or after rehabilitation implement erosion rectification and preventions measures as guided by an ECO

Eco Impact is of the opinion, and based on the survey and desk study done, that the proposed development activities; if designed and implemented according to the recommendations as provided in this report, will not have an unacceptable significantly negative impact on the environmental aspects of the site and surrounds as assessed in this report.

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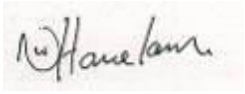
APPENDIX A: Declaration of Independence

THE INDEPENDENT PERSON WHO COMPILED OR REVIEWED A SPECIALIST REPORT OR UNDERTOOK A SPECIALIST PROCESS

I **Nicolaas Willem Hanekom**, as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- have and will not have no vested interest in the proposed activity proceeding;
- have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2010 (specifically in terms of regulation 17 of GN No. R. 543) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- have ensured that the names of all interested and affected parties that participated in terms of the specialist input/study were recorded in the register of interested and affected parties who participated in the public participation process;
- have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not; and
- am aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

Eco Impact is independent and does not have an interest in the business nor receive any payment other than fair remuneration for services rendered as required in terms of regulations.



Pri.Sci.Nat (Ecological Science) 400274/11

Signature of the specialist:
Name of company: Eco Impact
Date: 3 November 2017

APPENDIX B: Impact Assessment Methodology

Below is the assessment methodology utilized in determining the significance of the potential impacts on the biophysical environment, and where applicable the possible alternatives. The methodology is broadly consistent with that described in the Department of Environmental Affairs' Guideline Document on the EIA Regulations (1998) and as provided by the Shangoni Management Services.

For each potential impact, the significance is determined by specified factors as in Table 1. Significance is described prior to mitigation as well as with the most effective mitigation measure(s) in place.

The mitigation described in the document represents the full range of plausible and pragmatic measures that must be implemented.

Despite the attempts at providing a completely objective and impartial assessment of the environmental implications of proposed activities, the specialist can never completely escape the subjectivity inherent in attempting to define significance.

Recognising this, potential subjectivity in the current process is addressed as follows:

- Be clear about the difficulty of being completely objective in the determination of significance;
- Develop an explicit methodology for assigning significance to impacts and outlining this methodology in detail. Having an explicit methodology not only forces the assessor to come to terms with the various facets contributing toward determination of significance, thereby avoiding arbitrary assignment, but also provides the reader of the report with a clear summary of how the assessor derived the assigned significance; and
- Wherever possible, differentiating between the likely significance of potential environmental impacts as experienced by the various affected parties.

Although these measures may not totally eliminate subjectivity, they do provide an explicit context within which to review the assessment of impacts.

Table 1: Assessment criteria for the evaluation of impacts

Criteria	Description		
Nature	a description of what causes the effect, what will be affected, and how it will be affected.		
	Type	**Score**	**Description**
Extent (E)	None (No)	1	Footprint
	Site (S)	2	On site or within 100 m of the site
	Local (L)	3	Within a 20 km radius of the centre of the site
	Regional (R)	4	Beyond a 20 km radius of the site
	National (Na)	5	Crossing provincial boundaries or on a national / land wide scale
Duration (D)	Short term (S)	1	0 – 1 years
	Short to medium (S-M)	2	2 – 5 years
	Medium term (M)	3	5 – 15 years
	Long term (L)	4	> 15 years
	Permanent(P)	5	Will not cease
Magnitude (M)	Small (S)	0	will have no effect on the environment
	Minor (Mi)	2	will not result in an impact on processes
	Low (L)	4	will cause a slight impact on processes
	Moderate (Mo)	6	processes continuing but in a modified way
	High (H)	8	processes are altered to the extent that they temporarily cease
	Very high (VH)	10	results in complete destruction of patterns and permanent cessation of processes.
Probability (P) the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned	Very improbable (VP)	1	probably will not happen
	Improbable (I)	2	some possibility, but low likelihood
	Probable (P)	3	distinct possibility
	Highly probable (HP)	4	most likely
	Definite (D)	5	impact will occur regardless of any prevention measures
Significance (S)	Determined through a synthesis of the characteristics described above: **S = (E+D+M) x P** Significance can be assessed as low, medium or high		
Low: < 30 points:	The impact would not have a direct influence on the decision to develop in the area		
Medium: 30 – 60 points:	The impact could influence the decision to develop in the area unless it is effectively mitigated		
High: > 60 points:	The impact must have an influence on the decision process to develop in the area		
No significance	When no impact will occur or the impact will not affect the environment		
Status	Positive (+)		Negative (-)
The degree to which the impact can be reversed	Completely reversible (R)	90-100%	The impact can be mostly to completely reversed with the implementation of the correct mitigation and rehabilitation measures.
	Partly reversible (PR)	6-89%	The impact can be partly reversed providing that mitigation measures as stipulated in the EMP are implemented and rehabilitation measures are undertaken
	Irreversible (IR)	0-5%	The impact cannot be reversed, regardless of the mitigation or rehabilitation measures taking place
The degree to which the impact may cause irreplaceable loss of resources	Resource will not be lost (R)	1	The resource will not be lost or destroyed provided that mitigation and rehabilitation measures as stipulated in the EMP are implemented
	Resource may be partly destroyed (PR)	2	Partial loss or destruction of the resources will occur even though all management and mitigation measures as stipulated in the EMP are implemented
	Resource cannot be replaced (IR)	3	The resource cannot be replaced no matter which management or mitigation measures are implemented.
The degree to which the impact can be mitigated	Completely mitigatible (CM)	1	The impact can be completely mitigated providing that all management and mitigation measures as stipulated in the EMP are implemented
	Partly mitigatible (PM)	2	The impact cannot be completely mitigated even though all management and mitigation measures as stipulated in the EMP are implemented. Implementation of these measures will provide a measure of mitigatibility
	Un-mitigatible (UM)	3	The impact cannot be mitigated no matter which management or mitigation measures are implemented.

APPENDIX C: Relevant Environmental Legislation Considered

Agricultural Pests Act 36 of 1983
Atmospheric Pollution Prevention Act 45 of 1965 (regulations only)
Conservation of Agricultural Resources Act 43 of 1983
Constitution of the Republic of South Africa 1996
Environment Conservation Act 73 of 1989
Fencing Act 31 of 1963
Fertilizers Farm Feeds Agricultural Remedies and Stock Remedies Act 36 of 1947
Mineral and Petroleum Resources Development Act 28 of 2002
National Environmental Management Act 107 of 1998
National Environmental Management: Air Quality Act 39 of 2004
National Environmental Management: Biodiversity Act 10 of 2004
National Environmental Management: Protected Areas Act 57 of 2003
National Environmental Management: Waste Act 59 of 2008
National Forests Act 84 of 1998
National Veld and Forrest Fire Act 101 of 1998
National Water Act 36 of 1998

APPENDIX D: Photos of site and surrounds taken 20 October 2017

Photo 1: Proposed development area

Photo 2: Proposed development area.

Photo 3: Cultivated land and ESA2 Buffer area along the drainage line south of the study site.

Photo 4: Proposed development area, with planted row of pine trees.

Photo 5: Proposed development area

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Photo 6: Proposed development area.

Photo 7: Proposed development area.

Photo 8: Proposed development area

Photo 9: Proposed development area.

Photo 10: Proposed development area, start of transformed northern drainage line.

Photo 11: Proposed development area, transformed northern drainage line.

Photo 12: Proposed development area, transformed northern drainage line.

Photo 13: Proposed development area, transformed northern drainage line.

Photo 14: Proposed development area, transformed northern drainage line.

Photo 15: Proposed development area, *Acacia saligna* stand.

Photo 16: Proposed development area, transformed northern drainage line.

Photo 17: Proposed development area, transformed northern drainage line.

Photo 18: Proposed development area, end of transformed northern drainage line on study site.