Client	N&H Golden Miles Village Close Corporation
Project	COMMANDPARK EXTENSION 4 TOWNSHIP ESTABLISHMENT – DRAFT EMPr EIA REF NO.: 1/3/1/16/1N-321
Date	JULY 2022

Labesh

ability to sustain

N&H GOLDEN MILES VILLAGE CLOSE CORPORATION

COMMANDPARK EXTENSION 4 TOWNSHIP ESTABLISHMENT ON PORTION 562, 563, 565 & REMAINING EXTENT OF PORTION 25 OF THE FARM NAAUWPOORT 335 JS, MPUMALANGA PROVINCE

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME
EIA REF NO.: 1/3/1/16/1N-321

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Labesh
sustainable, natural resource management

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DEFINITIONS

Alternatives
In relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to the-
a) property on which or location where the activity is proposed to be undertaken;
b) type of activity to be undertaken;
c) design or layout of the activity;
d) technology to be used in the activity; or
e) operational aspects of the activity; and
includes the option of not implementing the activity.

Application
An application for an Environmental Authorisation (EA).

Biodiversity Plan
A spatial plan that identifies one or more categories of biodiversity priority areas, using the principles and methods of systematic biodiversity planning.

Biodiversity Sector Plan
A map of Critical Biodiversity Areas and Ecological Support Areas accompanied by contextual information, land and resource-use guidelines and supporting GIS data. The map must be produced using the principles and methods of systematic biodiversity planning. A Biodiversity Sector Plan is the precursor to a Bioregional Plan.

Biodiversity target (threshold)
The minimum proportion of each ecosystem type that needs to be kept in a natural or near-natural state in the long term in order to maintain viable representative samples of all ecosystem types and the majority of species associated with those ecosystem types.

Biosphere Reserve
An ecosystem with plants and animals of unusual scientific and natural interest. It is a title given by UNESCO to help protect these ecosystems and associated species etc. The plan is to promote management, research and education in ecosystem conservation. This includes the sustainable use of natural resources.

Buffer Area
Unless specifically defined, means an area extending 10 kilometres from the proclaimed boundary of a world heritage site or national park and 5 kilometres from the proclaimed boundary of a nature reserve, respectively, or that defined as such for a biosphere.

Conservation Area
Areas of land not formally protected by law, but informally protected by the current owners and users and managed at least partly for biodiversity conservation. Because there is no long-term security associated with conservation areas, they are not considered a guaranteed form of protection.

Critical Biodiversity Areas
Terrestrial and aquatic areas required to meet biodiversity targets for ecosystems, species or ecological processes, as identified in a systematic biodiversity plan.

Cumulative Impact
In relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

Development
The building, erection, construction or establishment of a facility, structure or infrastructure, including associated earthworks or borrow pits, that is necessary for the undertaking of a listed or specified activity, including any associated post development monitoring, but excludes any modification, alteration or expansion of such a facility, structure or infrastructure, including associated earthworks or borrow pits, and excluding the redevelopment of the same facility in the same location, with the same capacity and footprint.

Development footprint
Any evidence of physical alteration as a result of the undertaking of any activity.

EAP
An environmental assessment practitioner as defined in section 1 of the National Environmental Management Act (NEMA).

Ecological corridors
Ecological corridors, also referred to as biodiversity corridors, can be landscape structures of various size, shape and habitat composition that maintain, establish or re-establish natural landscape connectivity. They can have a continuous or interrupted structure or a structure of stepping stones (Jongman *et. al*., 2002).

Ecological Support Areas
Terrestrial and aquatic areas that are not essential for meeting biodiversity targets, but play an important role in supporting the ecological functioning of one or more Critical Biodiversity Areas, or in delivering ecosystem services.

EMPr
An Environmental Management Programme contemplated in regulations 19 and 23 of the Environmental Impact Assessment (EIA) Regulations, 2014.

Environment
The surroundings (biophysical, social and economic) within which humans exist and that are made up of:
(i) the land, water and atmosphere of the earth;
(ii) micro-organisms, plant and animal life;
(iii) any part or combination of (i) and (ii) and the interrelationships among and between them; and
(iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.

Environmental Impact Assessment
A systematic process of identifying, assessing and reporting environmental impacts associated with an activity and includes Basic Assessment and Scoping and Environmental Impact Reporting.

Environmental Impact Assessment Report
A report contemplated in regulation 23 of the EIA Regulations, 2014.

Environmental Management Plan
Environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning phases of a project are prevented; and that the positive benefits of the project are enhanced.

Important Bird Areas (IBA)
The Important Bird and Biodiversity Areas (IBA) Programme is one of BirdLife International's most important conservation initiatives. The IBA Programme identifies and works to conserve a network of sites critical for the long-term survival of bird species that are globally threatened, have a restricted range, are restricted to specific biomes/vegetation types, and that have significant populations, for example 20 000 water birds (www.birdlife.org.za).

Independent
In relation to an EAP, a specialist or the person responsible for the preparation of an environmental audit report, means-
a) that such EAP, specialist or person has no business, financial, personal or other interest in the activity or application in respect of which that EAP, specialist or person is appointed in terms of the EIA Regulations; or
b) that there are no circumstances that may compromise the objectivity of that EAP, specialist or person in performing such work;
excluding -
(i) normal remuneration for a specialist permanently employed by the EAP; or
(ii) fair remuneration for work performed in connection with that activity, application or environmental audit.

Indigenous Vegetation
Vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.

Integrated Development Plan (IDP)
A strategic development plan required by law and developed through participatory processes, to guide and inform all planning, budgeting, management and decision-making in a municipal area in South Africa. [Definition from Biodiversity for Development].

Industrial Complex
An area used or zoned for industrial purposes, including bulk storage, manufacturing, processing or packaging purposes.

Mitigation
To anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible.

Phased Activities
An activity that is developed in phases over time on the same or adjacent properties to create a single or linked entity.

Plan of Study for Environmental Impact Assessment
A study contemplated in regulation 22 of the EIA Regulations that forms part of a Scoping Report and sets out how an Environmental Impact Assessment will be conducted.

Present Ecological State (PES)
The PES of a river is expressed in terms of various components. That is, drivers (physico-chemical, geomorphology, hydrology) and biological responses (fish, riparian vegetation and aquatic invertebrates), as well as an integrated state, the EcoStatus.

Protected Area
An area of land or sea that is formally protected by law and managed mainly for biodiversity conservation. This is a narrower definition than the IUCN definition, which includes areas that are not legally protected and that would be defined in South Africa as Conservation Areas rather than Protected Areas.

Registered Interested and Affected Party
In relation to an application, means an Interested and Affected Party whose name is recorded in the register opened for that application in terms of regulation 42 of the EIA Regulations, 2014.

Scoping Report
A report contemplated in regulation 21 of the EIA Regulations, 2014.

S&EIR
The scoping and environmental impact reporting process contemplated in regulation 21 to regulation 24 of the EIA Regulations, 2014.

Significant Impact
An impact that may have a notable effect on one or more aspects of the environment or may result in non-compliance with accepted environmental quality standards, thresholds or targets and is determined through rating the positive and negative effects of an impact on the environment based on criteria such as duration, magnitude, intensity and probability of occurrence.

Specialist
A person that is generally recognised within the scientific community as having the capability of undertaking, in conformance with generally recognised scientific principles, specialist studies or preparing specialist reports, including due diligence studies and socio-economic studies.

Systematic Biodiversity Plan
A plan that identifies important areas for biodiversity conservation, taking into account biodiversity patterns (i.e. the principle of representation) and the ecological and evolutionary processes that sustain them (i.e. the principle of persistence). A Systematic Biodiversity Plan must set quantitative targets/thresholds for aquatic and terrestrial biodiversity features in order to conserve a representative sample of the biodiversity pattern and ecological processes.

Watercourse
(a) a river or spring;
(b) a natural channel in which water flows regularly or intermittently;
(c) a wetland, pan, lake or dam into which, or from which, water flows; and
any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act, 1998 (Act No. 36 of 1998); and
a reference to a watercourse includes, where relevant, its bed and banks.

Wetland
Land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

ABBREVIATIONS

BID	-	Background Information Document
CRR	-	Comments and Response Report
DARDLEA	-	Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs, Mpumalanga
DWS	-	Department of Water and Sanitation
EA	-	Environmental Authorisation
EAP	-	Environmental Assessment Practitioner
EIA	-	Environmental Impact Assessment
EIR	-	Environmental Impact Report
EMF	-	Environmental Management Framework
EMP	-	Environmental Management Programme
GN	-	Government Notice
I&AP	-	Interested and Affected Party
IWULA	-	Integrated Water Use Licence Application
NEMA	-	National Environmental Management Act, Act No. 107 of 1998, as amended
NEM:WA	-	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
NHRA	-	National Heritage Resources Act, Act No. 25 of 1999
NWA	-	National Water Act, Act No. 36 of 1998
R	-	Regulation
SAHRA	-	South African Heritage Resources Agency
S&EIR	-	Scoping and Environmental Impact Reporting

1. PROJECT TITLE

Commandpark Extension 4 Township Establishment on Portion 562, 563, 565 and Remaining Extent of Portion 25 of the Farm Naauwpoort 335 JS.

2. APPLICANT DETAILS

Applicant Name	N&H Golden Miles Village Close Corporation
Contact Person	Nic Grobler
Postal Address	P. O. Box 12159, Leraatsfontein 1038
Telephone Number	066 231 0179
Email Address	27798753481@vodamail.co.za

3. ENVIRONMENTAL ASSESSMENT PRACTITIONER DETAILS

Environmental Assessment Practitioner Company	Labesh (Pty) Ltd
Contact Person	Lourens de Villiers
Postal Address	Postnet Box 469, Private Bag X504, Sinoville, 0129
Telephone Number	082 789 6525
Fax Number	
Email Address	info@labesh.co.za
Qualifications	B.Sc Earth Science (North West University) Hons B.Sc Geography and Environmental Studies (North West University) M.Sc Water Resource Management (University of Pretoria)
Relevant experience	20 years' experience conducting Environmental Impact Assessment processes

The EAP's full Curriculum Vitae is attached under Appendix E.

4. LOCATION OF THE PROPOSED DEVELOPMENT AND ACTIVITIES

The property for the proposed development and its associated activities is as follows:

Property/Land Parcel	21 digit Surveyor General Code	Size (Hectares)
Portion 562 of the Farm Naauwpoort 335 JS	T0JS00000000033500562	67,4338Ha
Portion 563 of the Farm Naauwpoort 335 JS	T0JS00000000033500563	31,4104Ha
Portion 565 of the Farm Naauwpoort 335 JS	T0JS00000000033500565	16,6202Ha
Remainder of Portion 25 of the Farm Naauwpoort	T0JS00000000033500025	7,9880Ha
	Total Area	**123,4524Ha**

The project location is ±14km to the south south-east of Emalahleni CBD, in the Emalahleni Local Municipality, Nkangala District Municipality, Mpumalanga Province. Access to the project properties is from the R544 (Watermeyer Street).
The GPS coordinates for the project sites are as follows:

25°58'16.41"S; 29°16'43.29"E
25°58'41.17"S; 29°16'54.12"E
25°58'36.49"S; 29°17'19.20"E
25°58'21.18"S; 29°17'14.11"E

A locality map, provided on the next page, shows the location of the four project properties, at an appropriate scale.

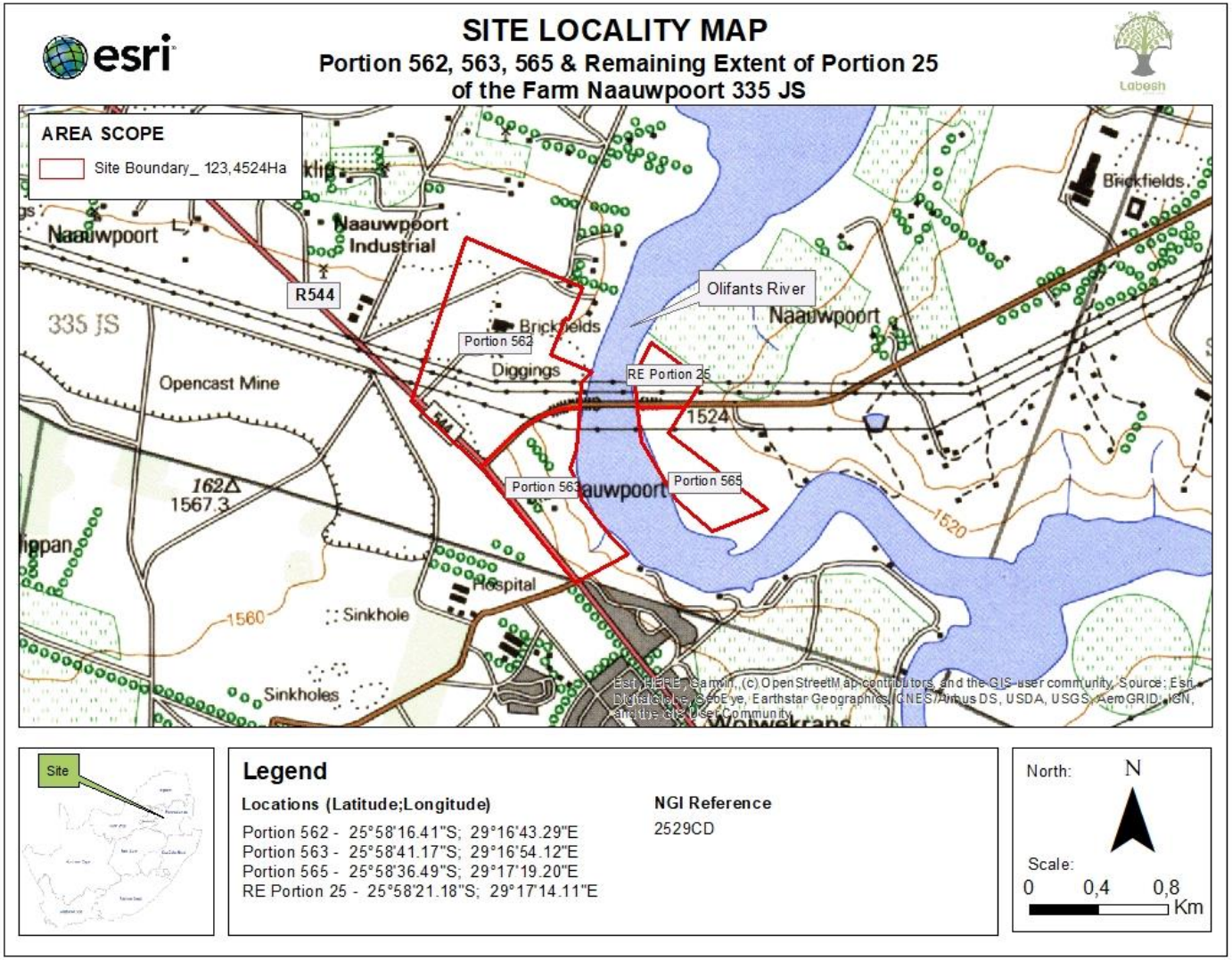


Figure 1: Site locality map

The following photographs give an indication of the current status of the project property.
















5. DESCRIPTION OF THE ASPECTS OF THE ACTIVITY THAT ARE COVERED BY THE EMPr AS IDENTIFIED BY THE PROJECT DESCRIPTION

5.1 Description of the activities to be undertaken

N&H Golden Miles Village Close Corporation (herein after referred to as the applicant) aims to establish a township to be known as Command Park Extension 4. The proposed project will entail a mixed land use township development to accommodate industrial and tourism development for the promotion of economic growth on the following properties:

- Portion 562 of the Farm Naauwpoort 335 JS;
- Portion 563 of the Farm Naauwpoort 335 JS;
- Portion 565 of the Farm Naauwpoort 335 JS; and
- Remaining Extent of Portion 25 of the Farm Naauwpoort 335 JS.

The four project properties are 123, 4524 Ha in extent. The area of land that will be developed is therefore 123, 4524 Ha.

Current activities on the project site

Portion 563, 565 and Remaining Extent of Portion 25 of the Farm Naauwpoort 335 JS, is currently open vacant land. Portion 562 of the Farm Naauwpoort 335 JS consists of a scatter of industrial related structures that include overhead electricity cables and towers.

The proposed project

The proposed development will consist of the following land uses. The allocation towards the different land uses is given in the table below:

Table 1: Land use differentiation and density units per hectare of the proposed development

Proposed uses	Number of Erven	Size (ha)	Height	Coverage	FAR
Industrial 1	41	54, 1289	3 Storeys	70%	0.7
Business 2	1	2, 2325	3 Storeys	70%	1.2
Tourism	3	31, 6047	N/A	N/A	N/A
Private Park	1	21, 1315	N/A	N/A	N/A
Special for refuse and water treatment plant	2	1, 8998	N/A	N/A	N/A
Special for Sewer purification plant	2	1, 0416	N/A	N/A	N/A
Private Road	2	5, 1210	N/A	N/A	N/A

The main goal of the development layout plan was to create an industrial and tourism park which is secure, accessible and convenient for the proposed businesses and clients of the township.

The proposed new township will consist of 41 industrial erven, 3 tourism erven, 1 business erf, 1 erf for a private park, 2 erven for refuse and water treatment plant, 2 erven for sewer purification plant and 2 erven for private roads.

Portion 562 of the Farm Naauwpoort 335 JS will accommodate:

- Industrial Erven;
- Park Erf; and
- Special Erven.

Portion 563 of the Farm Naauwpoort 335 JS will accommodate:

- Industrial Erven;
- Tourism Erf;
- Business Erf; and
- Special Erven.

Portion 565 of the Farm Naauwpoort 335 JS will accommodate:

- Tourism Erven.

Remaining Extent of Portion 25 of the Farm Naauwpoort 335 JS will accommodate:

- Tourism Erven.

The proposed development will take place in three (3) phases. Phase 1 will include the development of 11 erven for 'Industrial 1' zoning, 1 erf for 'Private Park' zoning, 2 erven for 'Tourism' zoning and 2 erven for 'Special Use' zoning. Phase 2 will include the development of 17 erven for 'Industrial 1' zoning. Phase 3 will include the development of 13 erven for 'Industrial 1' zoning, 1 erf for 'Business 2' zoning, 1 erf for 'Tourism' zoning and 2 erven for 'Special Use' zoning.

Figure 2:Site Layout Plan

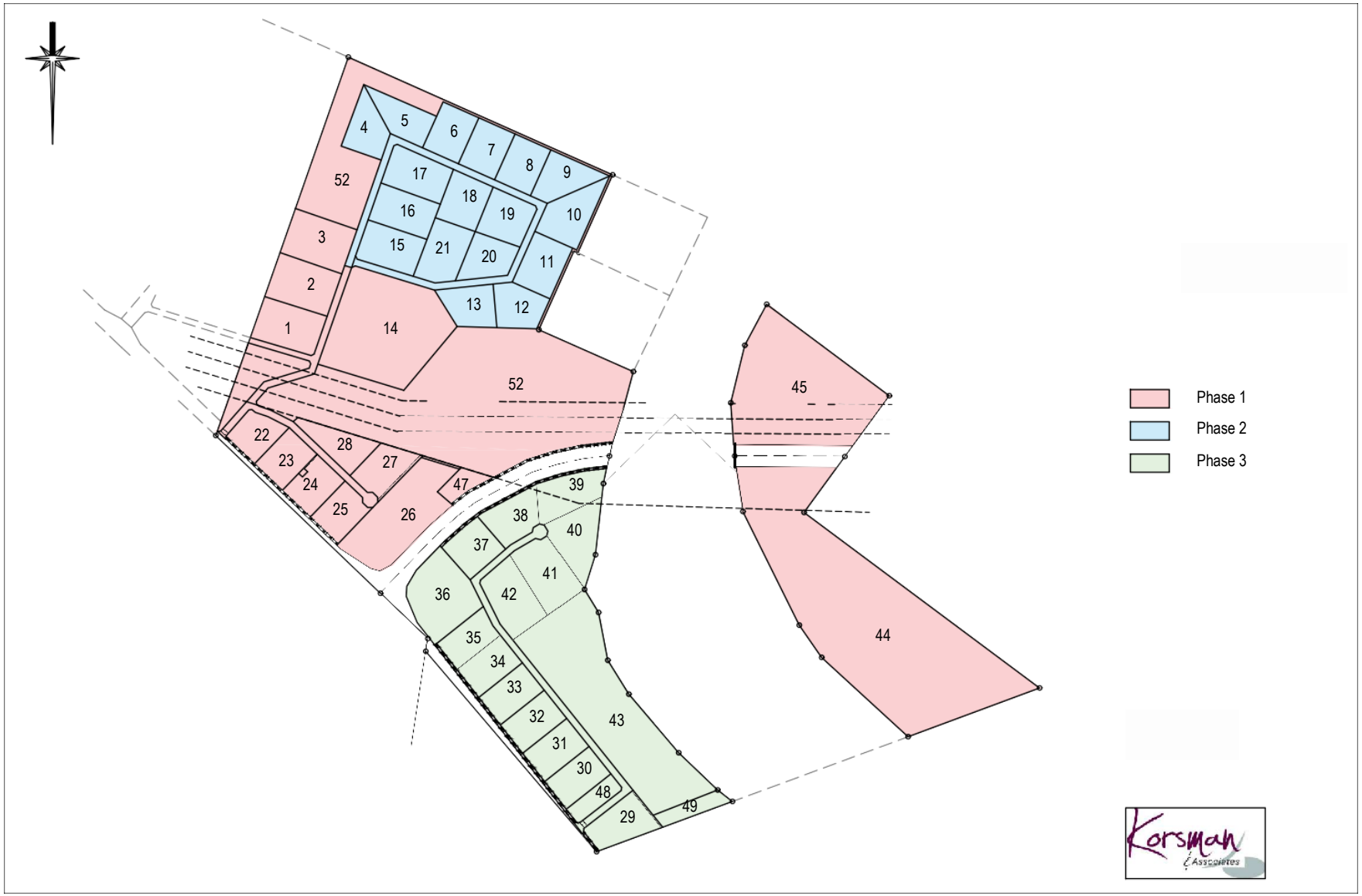
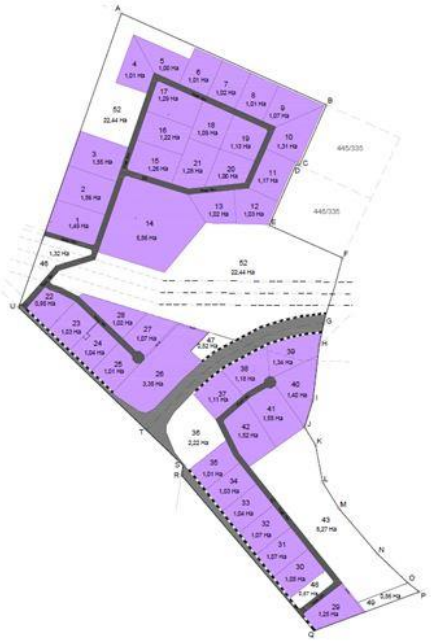
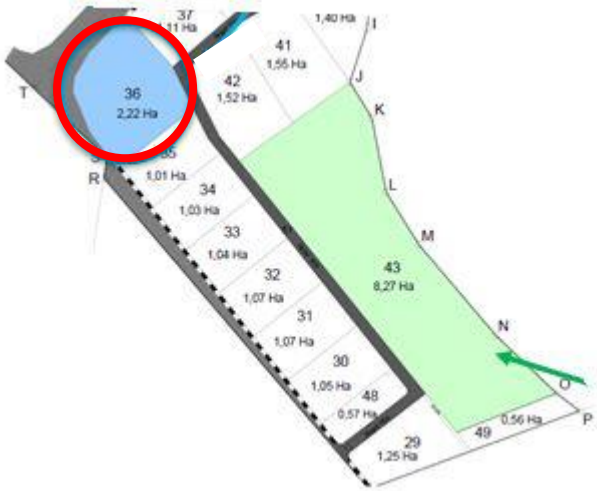
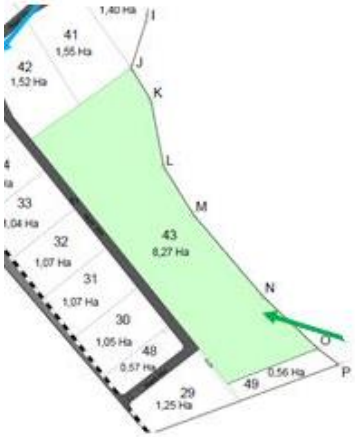
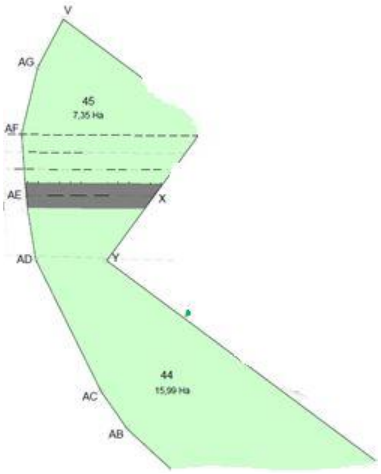
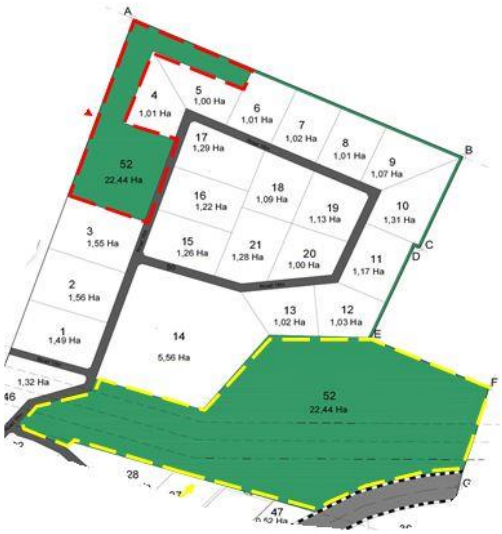
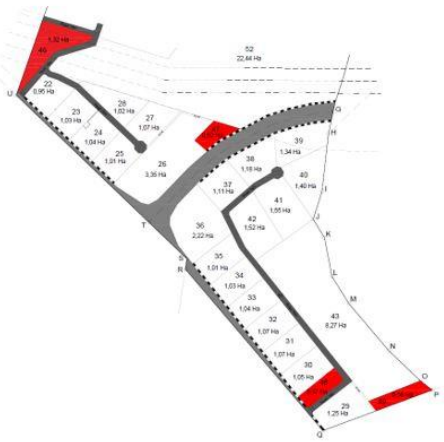


Figure 3: Phased Layout Plan

The proposed development breakdown:

• **Industrial Erven** 	The size and zoning of the industrial erven were chosen due to the increasing need within the Naauwpoort Industrial area for small, light industrial erven. The average erf size is approximately 1 hectare. The erven are serviced with a 16m wide road in order to provide enough manoeuvrability for industrial vehicles.
• **Business Erf** 	The business erf is specifically placed on the intersection to Duvha Park Power Station due to the visibility and accessibility the erf will enjoy. A 'Business 2' zoning aligns with the activity spine policy of Emalahleni. The applicant identified a need for a shopping centre within the Naauwpoort area and therefore decided to build a shopping centre on Erf 36 in order to serve the surrounding community of Emalahleni.
• **Tourism Erven** 	The aim of the applicant is to develop a lodge on Erf 43 in order to provide overnight lodging facilities to business man and/or contractors. Erf 43 also consists of a nice viewing point towards the Olifants river and will add to the aesthetic of the lodge.

	Erven 44 and 45 is aimed at creating camping sites and fishing spots alongside the Olifants river as there is a great demand for camping and fishing activities within the area. Additionally, hiking and cycling trials will also be created due to the scenery of the river and landscape.
• **Park Erven** 	The aim of the applicant is to develop a 'Hobby Park' on the tourism erven and which will be the first of its kind in Emalahleni. The Hobby Park will accommodate various hobbies such as 4x4 trials, paint ball, hiking, cycling, birding, archery, fishing, picnics and camping. Erf 52 is deliberately oddly shaped and consists of two portions of land which is connected by a 5m wide road running at the back of the industrial erven. The road will be able to give access to the separated land portions and will serve as a mountain bike trail. A portion of land in the north is undevelopable due to deep excavations. This area of land will be developed into a paintball course. The portion of land in the south is partially developable due to electrical servitudes running over the property. This portion of land will accommodate 4x4 vehicle, off road motorbike and mountain bike courses.
• **Special Erven** 	The township will consist of two water reclamation plants and refuse areas. Erf 46 will be able to serve the northern part of the township and Erf 48 will serve the southern part of the township. Erven are located on the highest points within the township in order to ensure efficient water pressure throughout the township. Additionally, the township will consist of two sewer package plants. Erf 47 will serve the northern part of the township and Erf 48 will serve the southern part of the township.

The advantages of clustering these functional facilities are summarised in the Guidelines for Human Settlement and Design (Volume 1, Chapter 5.5, 5:2005):

- Convenience, as all services are located in one centre;
- Sharing of high-cost elements can reduce costs considerably;
- Exposure for public facilities and the encouragement of their use;
- The integration of different communities;
- A reduction in inequalities in the provision of facilities;
- Offsetting of transport costs;
- Cutting down on the amount of land required;
- The promotion of full use of buildings;
- Lower building costs and running costs;
- Reduced maintenance costs;
- A large catchment area is less susceptible to localized demographic changes.

Land uses near and adjacent to the site

Portion 563, 565 and the Remainder of Portion 25 of the Farm Naauwpoort 335 JS, Mpumalanga Province, is currently vacant, underutilized land. Portion 562 of the Farm Naauwpoort 335 JS, Mpumalanga Province, currently consists of a scatter of industrial related structures. The proposed township is situated within the Naauwpoort Industrial Area (as earmarked by the Emalahleni SDF 2015/16), as well as eco-tourism along the Olifantsriver.

Near and adjacent to the project property (Portion 562 of the Farm Naauwpoort 335 JS) are the following land uses:

- North: Industrial activities and Agricultural land;
- East: Open, vacant land and Olifantsriver;
- South: Open, vacant land and Residential activities; and
- West: Industrial activities and open, vacant land.

Near and adjacent to the project property (Portion 563 of the Farm Naauwpoort 335 JS) are the following land uses:

- North: Open, vacant land with a scatter of Industrial related structures;
- East: Olifantsriver;
- South: Open, vacant land and Agricultural land; and
- West: Residential activities.

Near and adjacent to the project property (Portion 565 of the Farm Naauwpoort 335 JS) are the following land uses:

- North: Open, vacant land;
- East: Open, vacant land and Resorts;
- South: Olifantsriver; and
- West: Olifantsriver.

Near and adjacent to the project property (Remainder of Portion 25 of the Farm Naauwpoort 335 JS) are the following land uses:

- North: Agricultural land;
- East: Agricultural land;
- South: Open, vacant land; and
- West: Olifantsriver.

5.1.1 Roads and Storm Water

Access

The proposed site is surrounded by the R544 road and the road to Duvha Power Station. Two access points will be provided at the R544 road. The proposed access roads will be designed and applied for at the Mpumalanga Department of Public Works, Roads and Transport. The site can currently be accessed from an entrance located on the R544 road, approximately 500m from the R544 and Duvha road intersection. One access point will link up with the existing Benicon Park at the western area of the township. Erven 44 and 45 (situated across the Olifants river) will each have its own access point from Duvha road. This will also be designed and applied for at the Mpumalanga Department of Public Works, Roads and Transport. All relevant road signs and markings to comply with standards as set out by the South African Road Traffic Signs Manual. SCIP Engineering group has also been appointed to conduct a Traffic Impact Assessment (TIA) for the proposed development (Korsman & Associates, 2021).

Figure 4: Proposed Access Points

The current access location is sufficient for Phase 1 of the proposed township development. This road is to be constructed according to the most relevant standards of the Emalahleni Local Municipality. All road signs and markings are to comply with the standards as set out by the South African Road Traffic Signs Manual.

Roads

Internal road infrastructure will be required for the proposed township. Internal road infrastructure will include the development of private roads on two farm portions. One road will be developed within Portion 562 of the Farm Naauwpoort 335 JS and one road will be developed within Portion 563 of the Farm Naauwpoort 335 JS. This roads will be wider than 8 metres and longer than 1 kilometre. As a result, Government Notice R983 (Listing Notice 1), as amended by GN No. 327 of 7 April 2017, Activity No. 24 has been applied for as part of this environmental authorisation application.

Surface Drainage

There is no existing stormwater drainage system present on the proposed site. As a result of the site being undeveloped, stormwater currently flows on the surface.

Figure 5: Flow of stormwater on the property

The compilation of a new stormwater model was compiled by SCIP Engineering Group (Civil Services Report is attached to this Report). 1:5 design floods were calculated for the following separate areas:
Phase 1 – Industrial: 9,843 m^3/s
Phase 1 – Park: 0,047 m^3/s
Phase 1 – Tourism 0,014m^3/s
Phase 2 – 5,026 m^3/s
Phase 3 – 8,106 m^3/s

The above-shown peak flows for the 1:5 year floods for Phase 1 (Industrial), Phase 2 and Phase 3 will be drained from the roads via kerb inlets and stormwater pipes with a minimum diameter of 600mm. Water will be drained from these

surfaces onto the park and tourism areas and from these areas it will flow on the surface by means of natural contours into the Olifants river. For the park and tourism erven, minimal stormwater accumulated will be drained on the surface. The natural contours will assist flow into the Olifants river. A proposed stormwater system has been included in the Civil Services Report (attached to this report under Appendix D). The system is a proposed design and more extensive calculations are required for the final design.

5.1.2 Water Services

Existing Services

According to the Civil Services Report there exists no water supply infrastructure on the proposed site. The surrounding area also contains no bulk water supply infrastructure. The closest available connection is the system located in Duvha Park, approximately 4,8km away from the proposed site.

A total of 5 (five) boreholes are present on the proposed project site, but the boreholes will have to be tested by a registered hydrogeologist according to the correct standards in order to determine the capacity thereof:

- Phase 1: 3 Boreholes
- Phase 2: 1 Borehole
- Phase 3: 1 Borehole

Proposed Water Infrastructure (as per the Civil Services Report)

Phase 1

With the W11 classification and in accordance with the Guidelines of Human Settlement Planning and Design Handbook (Red Book), the projected annual average water demand for the development is calculated at a rate of 0,7kl / 100m^2 / day (F. A. R 0.7).

The Annual Average Daily Demand (AADD) is shown in the table below.

Table 2: AADD Calculation

Area (0.7 F.A.R)	Demand Rate	Peak Hour Factor	Demand (kl/day)	Demand (l/s)
137 410 m^2	kl / 100m^2 / day	3	4122.3	47.71

For the development above, an AADD of 4122.3 kl / day will be needed for the development.

Due to the type of zoning, the proposed development is classified as a High-Risk area for firefighting. Due to the unavailability of water infrastructure in the area it is proposed that water storage facilities for firefighting purposes be constructed. The firefighting demand calculation is shown in the table below.

Table 3: Fire Fighting Demand Calculation

Minimum Design Fire Flow	Duration of Design Fire Flow	Volume of Fire Fighting Demand	Volume of AADD	Total Storage Volume Needed
12 000l / min (200l/sec)	6 hours	4320 m^3	4122.3	8442m^3

If storage for firefighting is needed, a reservoir with a minimum capacity of 8500m^3 will be required. A complete fire design must be done to standards as outlined by Emalahleni Local Municipality.

Phase 2

With the W11 classification and in accordance with the Guidelines of Human Settlement Planning and Design Handbook (Red Book), the projected annual average water demand for the development is calculated at a rate of 0,7kl / 100m^2 / day (F. A. R 0.7). The Annual Average Daily Demand (AADD) is shown in the table below.

Table 4: AADD Calculation

Area (0.7 F.A.R)	Demand Rate	Peak Hour Factor	Demand (kl/day)	Demand (l/s)
132 440 m^2	kl / 100m^2 / day	3	3793.2	45.99

For the development above, an AADD of 3793.2 kl / day will be needed for the development.

Due to the type of zoning, the proposed development is classified as a High-Risk area for firefighting. Due to the unavailability of water infrastructure in the area it is proposed that water storage facilities for firefighting purposes be constructed. The firefighting demand calculation is shown in the table below.

Table 5: Fire Fighting Demand Calculation

Minimum Design Fire Flow	Duration of Design Fire Flow	Volume of Fire Fighting Demand	Volume of AADD	Total Storage Volume Needed
12 000l / min (200l/sec)	6 hours	4320 m^3	3793.2m^3	8113.2m^3

If storage for firefighting is needed, a reservoir with a minimum capacity of 8500m^3 will be required. A complete fire design must be done to standards as outlined by Emalahleni Local Municipality.

Phase 3

With the W11 classification and in accordance with the Guidelines of Human Settlement Planning and Design Handbook (Red Book), the projected annual average water demand for the development is calculated at a rate of 0,7kl / 100m^2 / day (F. A. R 0.7) for Industrial 1 and 1,2kl/ 100m^2 / day (F. A. R 1.2) for Business 2. The Annual Average Daily Demand (AADD) is shown in the table below.

Table 6: AADD Calculation

Area (F.A.R)	Demand Rate	Peak Hour Factor	Demand (kl/day)	Demand (l/s)
108 010 m^2 (Industrial)	kl / 100m^2 / day	3	3240.3	37.50
26 640 m^2 (Business)	kl / 100m^2 / day	3	799.2	9.25

For the development above, an AADD of 4039.5 kl / day will be needed for the development.

Due to the type of zoning, the proposed development is classified as a High-Risk area for firefighting. Due to the unavailability of water infrastructure in the area it is proposed that water storage facilities for firefighting purposes be constructed. The firefighting demand calculation is shown in the table below.

Table 7: Fire Fighting Demand Calculation

Minimum Design Fire Flow	Duration of Design Fire Flow	Volume of Fire Fighting Demand	Volume of AADD	Total Storage Volume Needed
12 000l / min (200l/sec)	6 hours	4320 m^3	4039.5m^3	8359.5m^3

If storage for firefighting is needed, a reservoir with a minimum capacity of 8500m^3 will be required. A complete fire design must be done to standards as outlined by Emalahleni Local Municipality.

5.1.3 Sewerage

Available Sewage Reticulation System

There currently no infrastructure available on the proposed project sites. The nearest wastewater treatment works, and which is under the jurisdiction of the Emalahleni Municipality, is situated across the Olifants river approximately 6km away from the proposed project sites.

Proposed Sewage Reticulation System

According to the Civil Services Report by SCIP Engineering Group and based on the Waterborne Sanitation Design Guide, the rate of average daily sewage production for the proposed industrial development is 0.56kl / 100m^2 / day. According to guidelines 15% of stormwater infiltration must be accounted for in the sewage outflow.

For Phase 1 of the development, a sewage production of 884.92 kl per day can be expected. Due to the unavailability of a main sewer system in the area, the construction of a sewage package plant is proposed. The sewage package plant will be designed with a minimum capacity of 11l/s (950.4 kl/day) in order to handle the sewage production. The sewage package plant will service the Industrial zoning of phase 1. For the tourism erven, ablution facilities will be provided for the minimal sewage produced and will be treated by means of a septic tank and French Drain System.

For Phase 2 of the development, a sewage production of 852.91 kl per day can be expected. Due to the unavailability of a main sewer system in the area, the construction of a sewage package plant is proposed. The sewage package plant will be designed with a minimum capacity of 10l/s (864 kl/day) in order to handle the sewage production.

For Phase 3 of the development, a sewage production of 867.14 kl per day can be expected. Due to the unavailability of a main sewer system in the area, the construction of a sewage package plant is proposed. The sewage package plant will be designed with a minimum capacity of 11l/s (950.4 kl/day) in order to handle the sewage production.

5.1.4 Electricity

An Electrical Engineering Service Report was conducted by Greenpower Electrical Engineering Ltd in August 2021. Detail as contained in the Electrical Engineering Service Report is described below. The Electrical Engineering Report is attached under Appendix D.

The following acts, municipal by-laws, codes of practice and regulations was used as guidelines, standards and technical requirement in the design of electrical engineering infrastructure and services for the development:

- The code of practice for the wiring of premises, SABS 0142 where applicable.
- The Occupational Health and Safety Act, act 85 of 1993, as amended.
- Eskom Standards and specifications
- The Municipal by-laws and special requirement of the supply authorities of the area or district concerned.

- The regulations of the local Fire Department.
- The regulations of the Post Office and Telkom.
- The National Building Regulations and Building Standards Act, Act 103 of 1977 and SABS 0400 of 1990.

Stands on the proposed development site will be zoned as follows:

Type of Zoning	Amount of Stands
Industrial 1	41 stands
Business 2	1 stand
Special	1 stand
Tourism	3 stands

The proposed site is fed by two different Eskom supply points:

Stand 1-45

Figure 6: Eskom Pole BRI/LA3 107/13

GPS points of Eskom pole: S-25° 58' 24.552"; E-29° 16' 30.6"
Eskom Pole Number: BRI/LA3 107/13
Eskom Transformer: 50kVA\22kV
Eskom Meter Number: 3122 5400 0024 18

Stand 46 & 47

Figure 7: Eskom Pole BRI/LA3 107/4A/1

GPS points of Eskom pole: S-25° 58' 40.716"; E-29° 16' 46.488"
Eskom Pole Number: BRI/LA3 107/4A/1
Eskom Transformer: 50kVA\22kV
Eskom Meter Number: 3114 4211 9139 6

It is proposed that an application be lodged to Eskom in order to obtain a feasibility quotation and budget quotation to supply adequate capacity to the proposed development.

Previous Eskom Electricity Supply
Previously Eskom supplied Portion 562 of the Farm Naauwpoort 335 JS with a bulk supply point. This point has however been decommissioned and are no longer in use.

Figure 8: Decommissioned Eskom Supply Point on the proposed site

Table 8: Estimated Required Power Requirements

Stand Description	No. of Stands	Estimated KVA Required per Stand	Total KVA Required per Stand
Industrial 1	41	50	2050
Business 2	1	200	200
Special	1	0	0

Stand Description	No. of Stands	Estimated KVA Required per Stand	Total KVA Required per Stand
Tourism (Stand 5 & 45)	2	16	32
Tourism (Stand 46) (Estimated load – Final load dependant on SDP)	1	50	50
Tourism (Stand 47) (Estimated load – Final load dependant on SDP)	1	16	16
Estimated Load Required			2348

Supply Voltage

The supply voltage to the proposed site will be 22kV as was determined on site.

Reticulation Methodology

Each industrial stand will be allowed an After Diversity Maximum Demand of 50kVA, 3 phase. Thus ±72Amp per stand. This is the industrial norm for an Industrial 1 development.

From an Eskom supply point, the applicant will have to install the required MV reticulation to make available capacity at the stand boundary of each stand. This must be done by means of:

- Installing overhead MV reticulation on wooden pole structures.
- Installing 100kVA and\or 200kVA pole top transformers to allow for the 50kVA per stand.
- The low voltage distribution to each stand will not form part of the initial project and will be installed by Eskom as and when applications for connections are received from each stand owner.
- Each stand owner in the proposed development will be liable for his\her own application, connection fee, deposit and supply agreement with Eskom.
- Should the new owner of a stand require more that the 50kVA, a separate application for this stand will have to be lodged by each of the consumers

Area Lighting

No area lighting will be required. Each consumer must install sufficient lighting on the stand for own use.

Energy Efficiency Requirements

In order to contribute to a more energy efficient development, it is recommended that some of the following methods be implemented by the applicant:

1. **Install energy saving LED light.**
2. **Motion Sensors for Outdoor Lighting** are activated when movement is detected at night, and they automatically turn off when movement is not detected.
3. **Occupancy Sensor for Indoor Lighting** are activated as soon as a person enters a room and once movement is not detected after a few minutes, these automatically turn off. These are typically used for bathrooms, conference rooms.
4. **Timer Controlled Lighting** can be programmed to turn on and off at certain times which can be used for indoor and outdoor lighting.
5. **Ventilation and air conditioning systems** - Air ventilation and air conditioning are usually interchanged but are completely different systems. In air ventilation, the system takes the air in the building and mixes fresh air from outside, without changing the air's temperature. The purpose of this is to refresh and remove the harmful elements in the air by bringing fresh air inside. By implementing a proper ventilation system less air conditioning is required

6. **Photovoltaic (PV) panels or more popularly known as solar panels** are used to self-generate electricity using the energy from the sun. The term "**photovoltaic**" refers to the direct conversion of light into electricity at the atomic level. Thus, the materials used in solar panels exhibit a photoelectric effect that causes them to absorb photons of light and release electrons. The freed electrons are then induced to travel through an electric circuit which can be used as electricity.

5.1.5 Traffic

The proposed site is surrounded by the R544 road and the road to Duvha Power Station. The proposed site will be accessed from two entrances. SCIP Engineering group has been appointed to conduct a Traffic Impact Assessment (TIA) for the proposed development (Korsman & Associates, 2021).

5.1.6 Waste

Hazardous waste

Hazardous waste generated on the premises will be removed and disposed of at a licensed waste facility.

Domestic waste

Domestic waste generated on the premises will be removed and disposed of at a licensed municipal waste facility.

5.2 Listed Activities triggered by the proposed development

The following listed activities are triggered by the proposed development and therefore require Environmental Authorisation, in terms of the Environmental Impact Assessment Regulations of 4 December 2014:

Table 9: Listed activities triggered by the proposed development

Government Notice and Activity Number	Wording as per the Listing Notice	Description as per the project description relating to each listed activity
Government Notice R983 (Listing Notice 1), as amended by GN No. 327 of 7 April 2017, Activity No. 9	The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water or stormwater (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more; excluding where- (a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve or railway line reserve; or (b) where such development will occur within an urban area.	The development of infrastructure for the bulk transportation of stormwater with an internal diameter of 0,6 metres.
Government Notice R983 (Listing Notice 1), as amended by GN No. 327 of 7 April 2017, Activity No. 11	The development of facilities or infrastructure for the transmission and distribution of electricity- (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or (ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more. excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is: a) temporarily required to allow for maintenance of existing infrastructure; b) 2 kilometres or shorter in length; c) within an existing transmission line servitude; and d) will be removed within 18 months of the commencement of development.	The installation of reticulation structures and transformers for the distribution of electricity outside urban areas with a capacity of less than 275 kilovolts.
Government Notice R983 (Listing Notice 1), as	The development of (i) canals exceeding 100 square metres in size; (ii) channels exceeding 100 square metres in size;	The development of buildings exceeding 100 square metres in size and infrastructure or structures with a physical footprint of 100 square metres

Government Notice and Activity Number	Wording as per the Listing Notice	Description as per the project description relating to each listed activity
amended by GN No. 327 of 7 April 2017, Activity No. 12	(iii) bridges exceeding 100 square metres in size; (iv) dams, where the dam, including infrastructure and water surface area, exceeds 100 square metres in size; (v) weirs, where the weir, including infrastructure and water surface area, exceeds 100 square metres in size; (vi) bulk stormwater outlet structures exceeding 100 square metres in size; (vii) marinas exceeding 100 square metres in size; (viii) jetties exceeding 100 square metres in size; (ix) slipways exceeding 100 square metres in size; (x) buildings exceeding 100 square metres in size; (xi) boardwalks exceeding 100 square metres in size; or (xii) infrastructure or structures with a physical footprint of 100 square metres or more: The development of: (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 10 square metres; or (ii) infrastructure or structures with a physical footprint of 100 square metres or more- Where such development occurs- (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of the watercourse; excluding-	or more within a watercourse and/or within 32m from the edge of a watercourse.

Government Notice and Activity Number	Wording as per the Listing Notice	Description as per the project description relating to each listed activity
	aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; bb) where such development activities are related to the development of a port or harbour in which case activity 26 in Listing Notice 2 of 2014 applies; cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; dd) where such development occurs within an urban area; or ee) where such development occurs within existing roads or road reserves railway line reserves; or ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.	
Government Notice R983 (Listing Notice 1), as amended by GN No. 327 of 7 April 2017, Activity No. 24	The development of a road (i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road a)which is identified and included in activity 27 in Listing Notice 2 of 2014; or b) where the entire road falls within an urban area; or c) which is 1 kilometre or shorter.	The development of 2 private roads (where the roads are wider than 8 metres and longer than 1 kilometre).
Government Notice R983 (Listing	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming,	Mixed land use township development on land previously used for agriculture purposes comprising of industrial erven, tourism erven,

Government Notice and Activity Number	Wording as per the Listing Notice	Description as per the project description relating to each listed activity
Notice 1), as amended by GN No. 327 of 7 April 2017, Activity No. 28	equestrian purposes or afforestation on or after 01 April 1998 and where such development: (i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.	business erf, transportation services erf, erf for a refuse area and erven for private roads. Development will occur outside of an urban area and the total land to be developed is 123, 4524 Ha.
Government Notice R984 (Listing Notice 2), as amended by GN No. 325 of 7 April 2017, Activity No. 15	The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	The clearance of 123, 4524 hectares of indigenous vegetation for mixed land use township development.
Government Notice R985 (Listing Notice 3), as amended by GN No. 324 of 7 April 2017, Activity No. 12	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. Mpumalanga: i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii. Within critical biodiversity areas identified in bioregional plans; or	The clearance of more than 300 square metres of indigenous vegetation within critical biodiversity areas identified in bioregional plans on Portion 565 of the Farm Naauwpoort 335 JS (±15 hectares) and the Remainder of Portion 25 of the Farm Naauwpoort 335 JS (±7,5 hectares).

Government Notice and Activity Number	Wording as per the Listing Notice	Description as per the project description relating to each listed activity
	iii. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning or proclamation in terms of NEMPAA.	

5. Water Use Licence Activities

The proposed site contains 5 boreholes, which will need to be tested to determine the capacity. The calculated Annual Average Daily Demand (as per the Civil Services Report) is calculated as follows:

- Phase 1: 4122.3 kl/day
- Phase 2: 3793.2 kl/day
- Phase 3: 4039.5 kl/day

The following proposed water uses require Water Use Registration and/or Licence applications in terms of Chapter 4 of the National Water Act, 1998 (Act No. 36 of 1998):

- Section 21(a): Taking water from a water resource – the abstraction of groundwater from boreholes onsite;
- Section 21(b): Storage of water – the storage of clean water in a number of storage tanks;
- Section 21(f): Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit; and
- Section 21(g): Disposing of waste or water containing waste in a manner which may detrimentally impact on a water resource.

The required Water Use Registration and/or Licence application will be submitted to the Department of Water and Sanitation in due course.

5.4 Environmental sensitivity overlay map - Map at an appropriate scale that superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers.

Please refer to figures below.

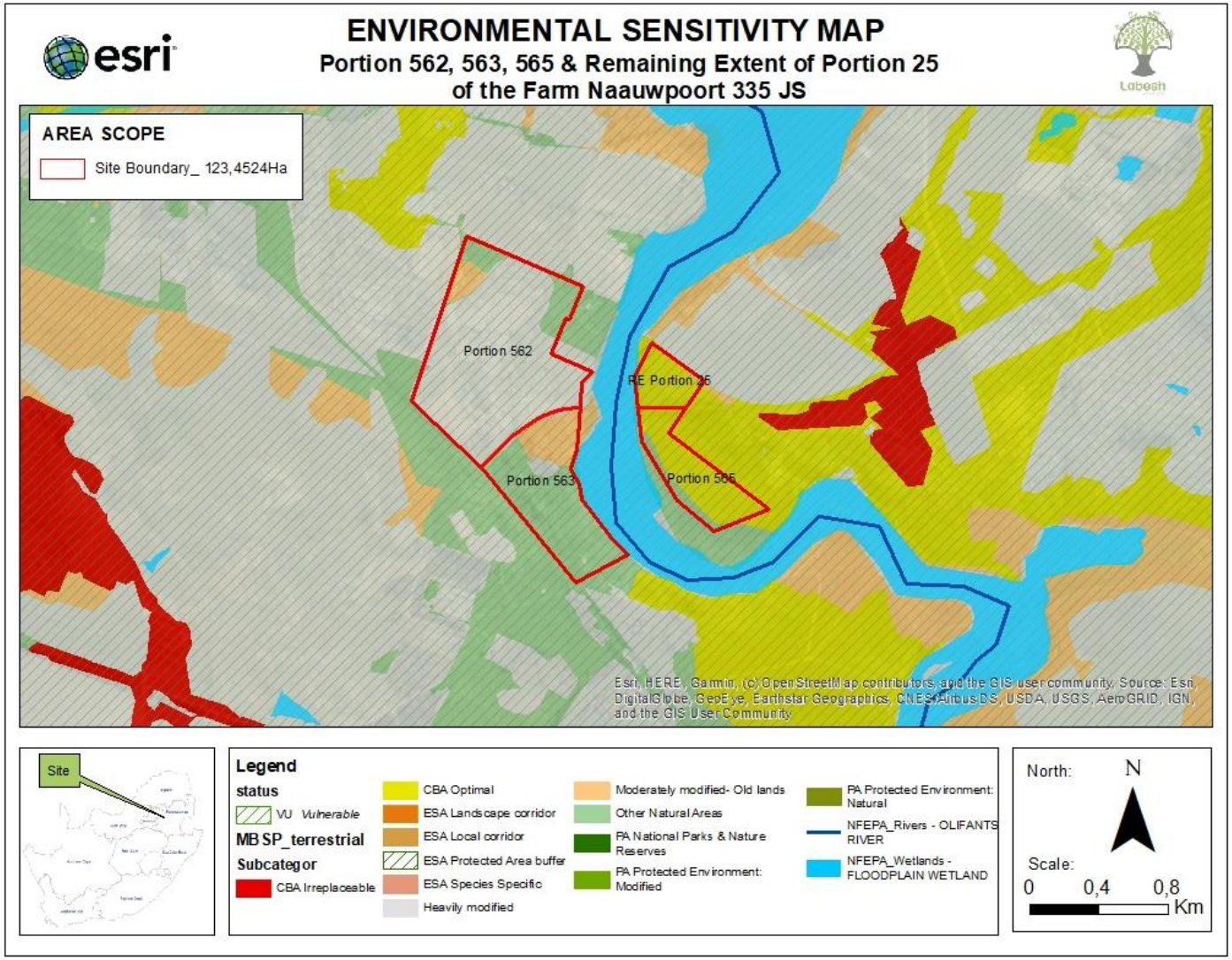


Figure 9: Environmental sensitivity map of the project site.

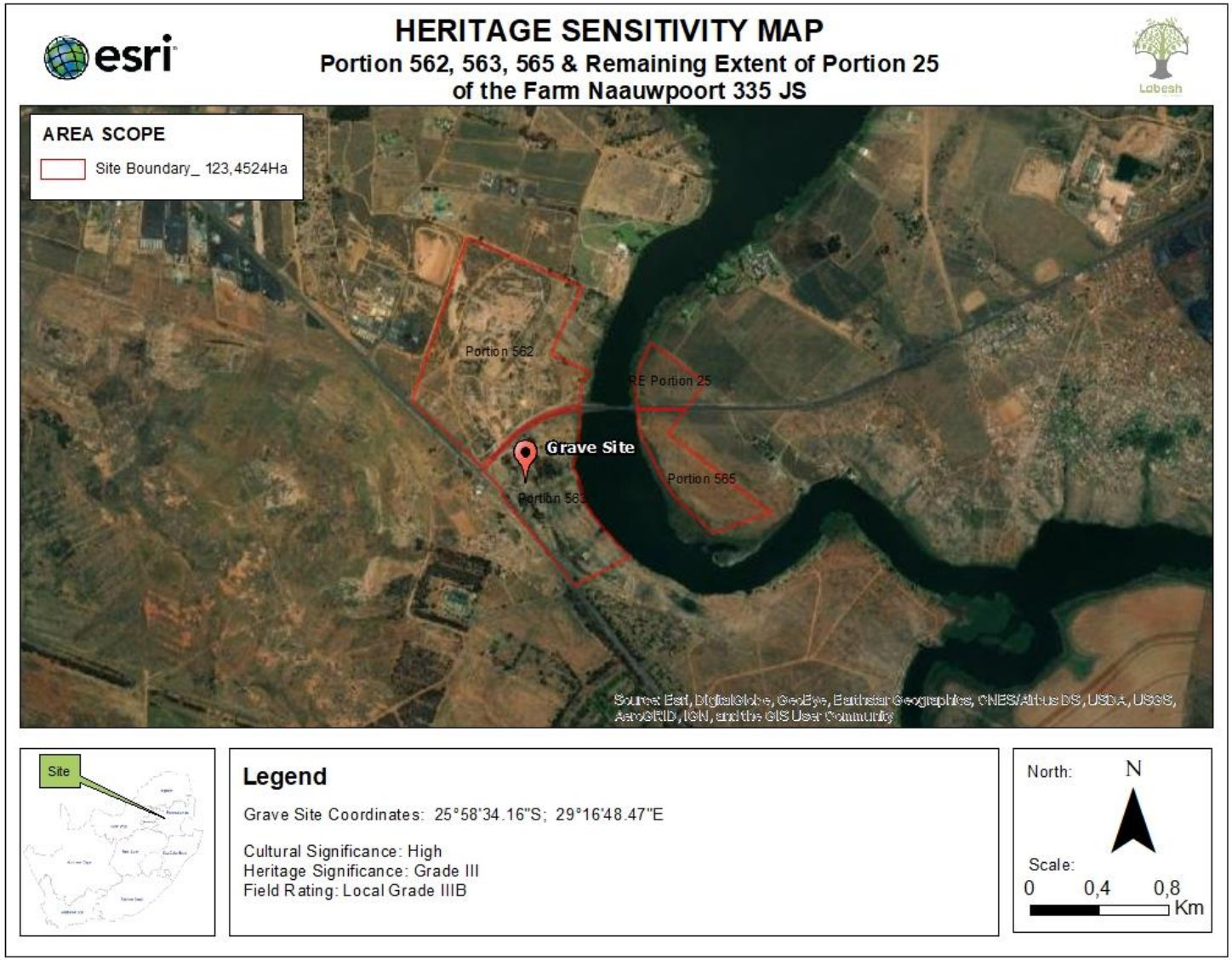
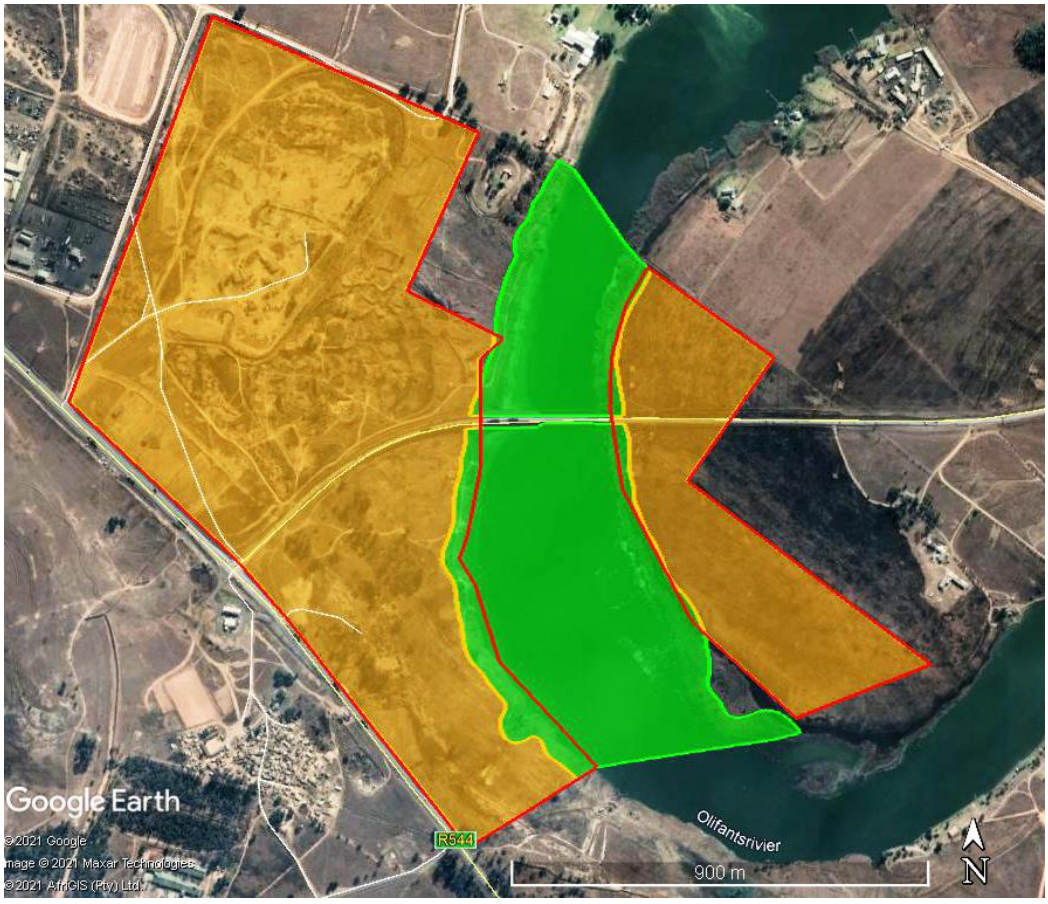
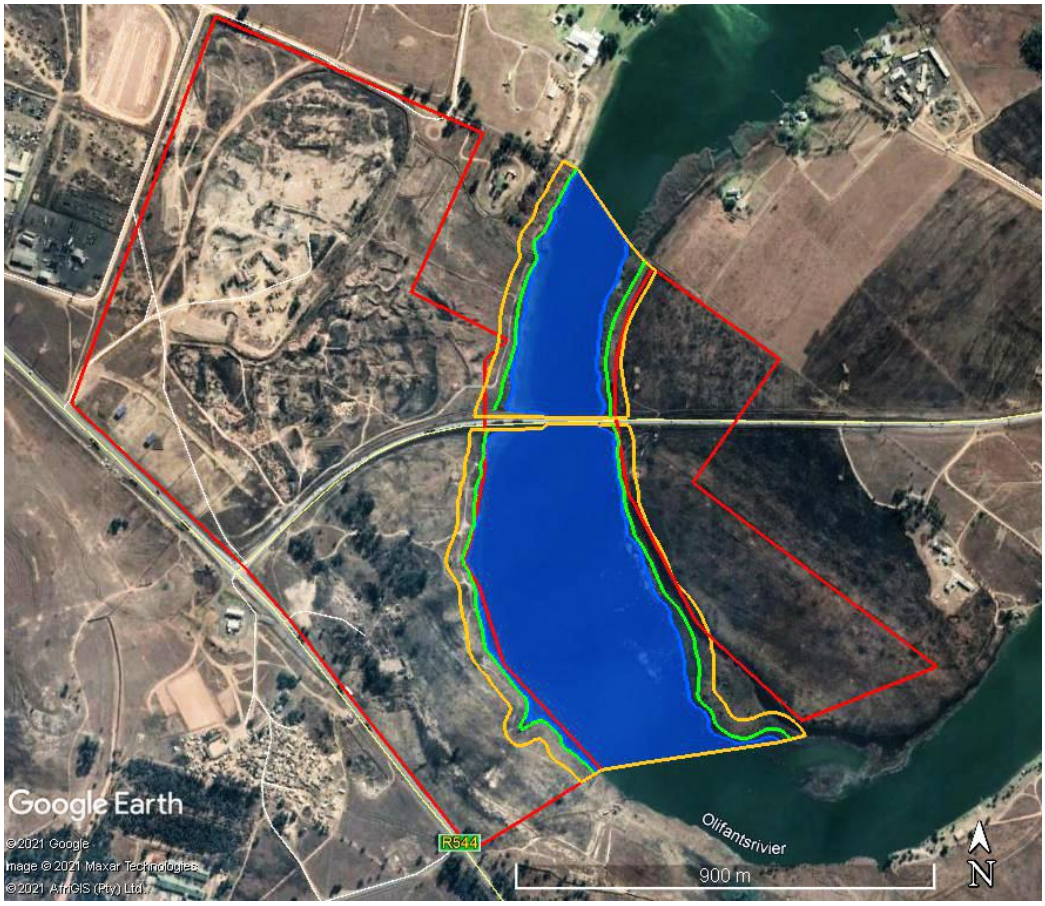


Figure 10: Environmental sensitivity map of the project site.



	Red outline	Boundaries of the site
	Green outline and shading	Medium-high sensitivity (mainly low)
	Orange-brown outline and shading	Medium-low sensitivity

Figure 11: Ecological sensitivity of the site (Terblanche, 2021)



Red outline	Boundaries of the site
Green outline	Outer edge of riparian zone
Orange outline	Outer edge of buffer zone
Blue outline and shading	Artificial Waterbody (In-channel Dam)

Figure 12: Witbank Dam (artificial waterbody), with its riparian zone (green outline of outer edge) and buffer zone (32 m; orange outline of outer edge) (Terblanche, 2021).

6. POLICY AND LEGISLATIVE CONTEXT OF THE APPLICATION

The following legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments are applicable to the proposed development and have or will be considered in this full Scoping and Environmental Impact Assessment process.

Legislation

The Constitution of South Africa, 1996 (Act No. 108 of 1996), as amended • *To establish a Constitution with a Bill of Rights for the RSA.*
The National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended • *To provide for the integrated management of the environment, and to regulate the 'Duty of Care' Principle.*
The Environmental Impact Assessment Regulations of 4 December 2014, as amended • *To regulate and control the authorisation of certain listed activities.*
The National Heritage Resources Act, 1999 (Act No. 25 of 1999), as amended • *To introduce an integrated and interactive system for the management of the national heritage resources.*
The National Appeal Regulations – Government Notice No. R.993 of 8 December 2014
Promotion of Access to Information Act, 2000 (Act No 2 of 2000 as amended) • *To give effect to the constitutional right of access to any information held by the State and any information that is held by another person and that is required for the exercise or protection of any rights.*
The National Water Act, 1998 (Act No. 36 of 1998), as amended • *To provide for fundamental reform of the law relating to water resources*
The National Environmental Management: Waste Act (Act No. 59 of 2008) • *To reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation.*
The National Environmental Management: Air Quality (Act No. 39 of 2004) • *To reform the law regulating air quality to protect the environment by providing reasonable measures for the prevention of pollution. To provide for national norms and standards regulating air quality monitoring, management and control.*

Plans

The Mpumalanga Biodiversity Sector Plan, 2014

Guidelines

Guide on Need and Desirability in terms of the Environmental Impact Assessment (EIA) Regulations, 2010
Guideline on Public Participation in the Environmental Impact Assessment Process, 2012

Spatial tools

National Web Based Environmental Screening Tool
SANBI Biodiversity GIS Database

Provincial development planning frameworks

Mpumalanga Spatial Development Framework, 2019

Municipal development planning frameworks

Emalahleni Local Municipality – Spatial Development Framework Final Report, 2011
Emalahleni Local Municipality – Spatial Development Framework Final Report, 2013/2014
Emalahleni Local Municipality – The Integrated Municipal Environmental Policy, 2018
Emalahleni Local Municipality – Reviewed and Approved Integrated Development Plan, 2013/2014

7. DESCRIPTION OF IMPACT MANAGEMENT OUTCOMES, MANAGEMENT STATEMENTS AND IMPACTS AND RISKS THAT NEED TO BE AVOIDED, MANAGED AND/OR MITIGATED

7.1 Impact Management Outcomes

Please refer to *Table 10* under Section 8 below.

7.2 Impact Management Statements

The applicant, N&H Golden Miles Village Close Corporation, commits to implementing the mitigation actions contained in this Environmental Management Programme in order to ensure that the environmental impacts from the proposed development are minimised.

7.3 Impacts and risks that need to be avoided, managed and/or mitigated

The following impacts and risks have been identified for the preferred alternative and need to be avoided, managed and/or mitigated:

Impact	Risks
Planning & Design Phase	• Inadequate planning and design of the proposed project/development that could result in environmental impacts that could have been avoided.
Wetlands	
Construction Phase	• Changing the quantity and fluctuation properties of the watercourse. The sources of this impacts include: ▪ Development within the water resource (Witbank Dam); ▪ Lack of adequate rehabilitation resulting in invasion by exotic plants; ▪ Material draining into Witbank Dam; and ▪ Damage to vegetated areas. • Changing the amount of sediment entering water resource and associated change in turbidity (increasing or decreasing the amount). Possible sources of the impacts include: ▪ Clearing of surface vegetation will expose the soils, which in rainy events would wash through the watercourse, causing sedimentation. In addition, indigenous vegetation communities are unlikely to colonise eroded soils successfully and seeds from proximate alien invasive trees can spread easily into these eroded soil; ▪ Disturbance of soil surface; ▪ Disturbance of slopes through creation of roads and tracks adjacent to the watercourse; ▪ Changes in runoff characteristics; ▪ Erosion (e.g. gully formation, bank collapse); and ▪ Vehicles impacting on surface vegetation. • Alteration of water quality – toxic contaminants (including toxic metal ions (e.g. copper, lead, zinc) and hydrocarbons. Possible sources of the impacts include: ▪ Runoff from road surfaces; and ▪ Discharge of solvents, and other industrial chemicals. • Changing the physical structure within a water resource (habitat). Possible sources include: ▪ Encroachment to achieve maximum commercial returns;

Impact	Risks
	▪ Deposition of wind-blown sand; ▪ Loss of fringing vegetation and erosion; ▪ Alteration in natural fire regimes; and ▪ Loss of vegetation • Introduction and spread of alien vegetation. The moving of soil and vegetation resulting in opportunistic invasions after disturbance and the introduction of seed in building materials and on vehicles. Invasions of alien plants can impact on hydrology, by reducing the quantity of water entering a wetland, and outcompete natural vegetation, decreasing the natural biodiversity. Once in a system, alien invasive plants can spread through the catchment. If allowed to seed before control measures are implemented alien plans can easily colonise and impact on downstream users.
Operational Phase	• Changing the quantity and fluctuation properties of the watercourse by, for example, storm water input, or restricting water flow. The sources of this impacts include: ▪ The compaction of soil; ▪ The removal of vegetation; and ▪ Surface water redirection. • Changing the amount of sediment entering water resource and associated change in turbidity (increasing or decreasing the amount). Construction, operational and decommissioning activities will result in earthworks and soil disturbance as well as the removal of natural vegetation. This could result in the loss of topsoil, sedimentation of the wetland and increase the turbidity of the water. Possible sources of the impacts include: ▪ Clearing of surface vegetation will expose the soils, which in rainy events would wash through the watercourse, causing sedimentation. In addition, indigenous vegetation communities are unlikely to colonise eroded soils successfully and seeds from proximate alien invasive trees can spread easily into these eroded soils; ▪ Disturbance of the soil surface; ▪ Disturbance of slopes through the creation of roads and tracks adjacent to the watercourses; and ▪ Erosion (e.g. gully formation and bank collapse). • Introduction and spread of alien vegetation. The moving of soil and vegetation resulting in opportunistic invasions after disturbance and the introduction of seed in building materials and on vehicles. Invasions of alien plants can impact on hydrology, by reducing the quantity of water entering a wetland, and outcompete natural vegetation, decreasing the natural biodiversity. Once in a system, alien invasive plants can spread through the catchment. If allowed to seed before control measures are implemented alien plans can easily colonise and impact on downstream users. • Changes in water quality due to foreign materials and increased nutrients impact ratings. Construction, operational and decommissioning activities will result in the discharge of solvents and other industrial chemicals, leakage of fuel/oil from vehicles and the disposal of sewage resulting in the loss of sensitive biota in the wetlands/rivers and a reduction in wetland function. Could possibly impact on groundwater.
Post-Construction and Rehabilitation Phase	• Same as under construction phase.

Impact	Risks
Decommissioning Phase	No decommissioning activities are anticipated or planned for the proposed project. Therefore, no impacts have been identified or assessed as part of this Environmental Impact Assessment process.
Aquatic Environment	
Construction Phase	• Increased surface water runoff due to hardened surfaces: During the construction phase of the development the use of heavy machinery, concrete foundations, compacted ground and impermeable surfaces will result in an increase in hardened surfaces. Hardened surfaces reduce infiltration rates and increase runoff volumes and velocities. The runoff from the construction activities is most likely to end up in the Olifantsriver. This can have impacts downstream where the increase in flow is concentrated; increase the risk of erosion and sedimentation; destroy riparian vegetation; and destabilise watercourses. A decrease in infiltration can also reduce natural recharge to the shallow and groundwater zones and subsequently may impact on the natural watercourses nearby. • Increased erosion and sedimentation: Any bare soil resulting from the construction and associated vegetation clearing will be susceptible to erosion, especially during the rainy season. The increase in erosion and dust generation can result in increased sediment loads. Sedimentation will reduce the water quality which can also affect aquatic life through the smothering of riverine habitat and fish gill clogging. • Sewerage spill: Raw sewerage will have a severe impact upon the water quality if it enters a river. The sewerage contains elevated levels of nutrients (nitrates and phosphates), disease causing bacteria (in particular *E. coli*) and large volumes of waste matter. This will make the water undrinkable. The large amount of waste matter will increase the turbidity and provide a habitat for bacteria to breed and feed on the suspended material. Increases in the turbidity of the water will block out sunlight which is necessary for all forms of life to exist in the water. It also blocks the gills of aquatic organisms, making it difficult for them to breathe as well as hunt and catch food. The excess nutrients cause massive algal growth, which could result in eutrophication.
Operational Phase	• Increased surface water runoff due to hardened surfaces: During the operational phase compacted ground and impermeable surfaces will result in an increase in hardened surfaces. Hardened surfaces reduce infiltration rates and increase runoff volumes and velocities. The runoff is most likely to end up in the Olifantsriver. This can have impacts downstream where the increase in flow is concentrated; increase the risk of erosion and sedimentation; destroy riparian vegetation; and destabilise watercourses. A decrease in infiltration can also reduce natural recharge to the shallow and groundwater zones and subsequently may impact on the natural watercourses nearby. • Increased erosion and sedimentation: Any bare soil will be susceptible to erosion, especially during the rainy season. The increase in erosion and dust generation can result in increased sediment loads. Sedimentation will reduce the water quality which can also affect aquatic life through the smothering of riverine habitat and fish gill clogging. • Sewerage spill: Raw sewerage will have a severe impact upon the water quality if it enters a river. The sewerage contains elevated levels of nutrients (nitrates and phosphates), disease causing bacteria (in particular *E. coli*) and large volumes of waste matter. This will make the water undrinkable. The large amount of waste matter

Impact	Risks
	will increase the turbidity and provide a habitat for bacteria to breed and feed on the suspended material. Increases in the turbidity of the water will block out sunlight which is necessary for all forms of life to exist in the water. It also blocks the gills of aquatic organisms, making it difficult for them to breathe as well as hunt and catch food. The excess nutrients cause massive algal growth, which could result in eutrophication.
Post-Construction and Rehabilitation Phase	• Same as under construction phase.
Decommissioning Phase	No decommissioning activities are anticipated or planned for the proposed project. Therefore, no impacts have been identified or assessed as part of this Environmental Impact Assessment process.
Surface and Groundwater	
Construction Phase	• Pollution of surface and/or groundwater resources due to the potential release of pollutants, such as chemicals, especially during the construction phase. • Pollution of surface and/or groundwater resources due to poor waste management. • Pollution of surface and/or groundwater resources due to the incorrect management of chemical substances and dangerous goods (fuels, oils etc.). • Pollution of surface and/or groundwater resources due to runoff of contaminated stormwater. • Pollution of surface and/or groundwater resources due to the incorrect management of concrete mixing. • Pollution of surface and/or groundwater resources due to sewage spills from chemical toilets. • Pollution of surface and/or groundwater resources due to the potential release of wastewater (sewage and wash water). • Unsustainable utilisation of groundwater.
Operational Phase	• Pollution of surface and/or groundwater resources due to poor waste management. • Pollution of surface and/or groundwater resources due to the incorrect management of chemical substances and dangerous goods (fuels, oils etc.). • Pollution of surface and/or groundwater resources due to runoff of contaminated stormwater. • Pollution of surface and/or groundwater resources due to sewage spills from ablution facilities. • Pollution of surface and/or groundwater resources due to the potential release of wastewater (sewage and wash water). • Unsustainable utilisation of water resources.
Post-Construction and Rehabilitation Phase	• Same as under construction phase.
Decommissioning Phase	No decommissioning activities are anticipated or planned for the proposed project. Therefore, no impacts have been identified or assessed as part of this Environmental Impact Assessment process.
Fauna	
Construction Phase	• Loss of exotic species, declared weeds and invader plants: It is recommended that noxious alien trees are eradicated before construction is commenced. However, inevitably new gardens will be established by planting exotics. This may ecologically not be puritan but can be expected to favour an increase of garden birds.

Impact	Risks
	• Loss of ecological sensitive and important vegetation units: When expressed as vertebrate habitat the wetlands and water bodies are deemed as sensitive and their integrity are not to be jeopardized during the construction or operational phases. • Loss of ecosystem function (e.g. reduction in water quality, soil pollution): Storm water run-off from the hard-cover areas of the development could amount to significant volumes inundating the water bodies, unless contained. Unmanaged water masses and quality can be expected to harm the water bodies and streambeds. • Loss of faunal habitat: The likelihood that the proposed development will displace the biological components of the plains and slopes is high, but the ecological impact of this loss is spatially and ecologically deemed as small. • Loss/displacement of threatened or protected fauna: Few, if any, of the Red Data species still persisting on the terrestrial and rupicolous habitats will survive. These will be displaced in the face of the planned development. Such a loss will be the ultimate stage of a spiral decline of species richness commenced decades ago.
Operational Phase	• Loss of ecological sensitive and important vegetation units: When expressed as vertebrate habitat the wetlands and water bodies are deemed as sensitive and their integrity are not to be jeopardized during the construction or operational phases. • Loss of ecosystem function (e.g. reduction in water quality, soil pollution): Storm water run-off from the hard-cover areas of the development could amount to significant volumes inundating the water bodies, unless contained. Unmanaged water masses and quality can be expected to harm the water bodies and streambeds.
Post-Construction and Rehabilitation Phase	• Disturbance of any fauna species that may be resident onsite.
Decommissioning Phase	No decommissioning activities are anticipated or planned for the proposed project. Therefore, no impacts have been identified or assessed as part of this Environmental Impact Assessment process.
Flora	
Construction Phase	• Removal of natural, good condition vegetation, due to: ▪ Clearing of vegetation for construction of the township as well as infrastructure; ▪ Access roads; ▪ Illegal disposal and dumping of construction material such as cement or oil during construction; and ▪ Edge effects from construction. • Destruction of plant species that are 'Declining', 'Rare' or provincially protected: Construction activity on the rocky ridge, especially the area where these plants are concentrated. • Destruction of moist grassland; and deterioration of the vegetation associated with moist grasslands: Clearing of the vegetation and change to water runoff patterns and soil hydrology; and the deterioration of vegetation in moist grasslands due to edge effects, sedimentation, compaction or increased pollutants. • Loss of the ecological function of the moist grasslands: Polluted water reaching the watercourses and moist grassland; and the lack of natural vegetation and the subsequent loss of the ecological function of the vegetation as catchment to the moist grassland and downstream watercourse.

Impact	Risks
	• Deterioration of natural vegetation and eventual loss of vegetation: Edge effects from the development; and altered fire regime where natural fires are prevented. • Possible increase in exotic and invasive vegetation: Alien vegetation spreading from existing infestation into disturbed soils as well as the dam area; and exotic plant species from gardens spreading to the rocky grasslands, moist grasslands and subsequently downstream. • Bush densification: ▪ Increase in bush encroacher species; and ▪ Change in vegetation structure.
Operational Phase	• Possible increase in exotic and invasive vegetation: Alien vegetation spreading from existing infestation into disturbed soils as well as the dam area; and exotic plant species from gardens spreading to the rocky grasslands, moist grasslands and subsequently downstream. • Bush densification: ▪ Increase in bush encroacher species; and ▪ Change in vegetation structure.
Post-Construction and Rehabilitation Phase	• Establishment and spread of alien invasive vegetation (onsite and further than the site).
Decommissioning Phase	No decommissioning activities are anticipated or planned for the proposed project. Therefore, no impacts have been identified or assessed as part of this Environmental Impact Assessment process.
Heritage Resources	
Construction Phase	• Disturbance or destruction of cultural and heritage resources.
Operational Phase	• Disturbance or destruction of cultural and heritage resources.
Post-Construction and Rehabilitation Phase	• Disturbance or destruction of cultural and heritage resources.
Decommissioning Phase	No decommissioning activities are anticipated or planned for the proposed project. Therefore, no impacts have been identified or assessed as part of this Environmental Impact Assessment process.
Paleontological Resources	
Construction Phase	• Construction and development activities resulting in a disturbance or destruction of palaeontological resources: ▪ Earth moving equipment/machinery (front end loaders, excavators, graders, dozers); and ▪ Sealing-in or destruction of fossils by development, vehicle traffic and human disturbance.
Operational Phase	None anticipated.
Post-Construction and Rehabilitation Phase	• Same as under construction phase.
Decommissioning Phase	No decommissioning activities are anticipated or planned for the proposed project. Therefore, no impacts have been identified or assessed as part of this Environmental Impact Assessment process.
Air Quality and Noise	

Impact	Risks
Construction Phase	• Generation of dust; • Release of vehicle emissions from construction vehicles; and • Generation of nuisance and noise.
Operational Phase	• Generation of dust; • Release of vehicle emissions from vehicles; and • Generation of nuisance and noise.
Post-Construction and Rehabilitation Phase	• Same as under construction phase.
Decommissioning Phase	No decommissioning activities are anticipated or planned for the proposed project. Therefore, no impacts have been identified or assessed as part of this Environmental Impact Assessment process.
Land Capability	
Construction Phase	• Construction of industrial complexes, business complexes, tourism complexes, vehicle parking areas, roads etc.: The current arable, grazing or wilderness land capability will cease completely until the structures is removed. • Possible contamination of soil by spillages of fuel or oil by mechanical equipment: The soil's physical and chemical properties will be adversely affected and will cause some reduction in land capability. • Possible soil erosion at exposed building footprints due to higher runoff: Soil erosion will adversely affect land capability.
Operational Phase	• Use and maintenance of industrial complexes, business complexes, tourism complexes, vehicle parking areas, roads etc.: The pre-construction land capability at areas covered by concrete, tar or paving will remain ceased. • Possible contamination of soil by spillages of fuel or oil by mechanical equipment: The soil's physical and chemical properties will be adversely affected and will cause some reduction in land capability.
Post-Construction and Rehabilitation Phase	• Possible contamination of soil by spillages of fuel or oil by mechanical equipment: The soil's physical and chemical properties will be adversely affected and will cause some reduction in land capability.
Decommissioning Phase	No decommissioning activities are anticipated or planned for the proposed project. Therefore, no impacts have been identified or assessed as part of this Environmental Impact Assessment process.
Soil	
Construction Phase	• The construction of structures that cover the soil surface by means of concrete, tar or paving: ▪ Compaction of the soil surface for building foundations, parking areas etc. will alter the soil's physical properties negatively; and ▪ Covering the soil surface with concrete, tar or paving will cause productive functioning of the soil to cease completely. • Possible contamination of soil by spillages of fuel or oil by mechanical equipment: ▪ Possible contamination of soil by spillages of fuel or oil by mechanical equipment, with soil physical and chemical properties being adversely affected. • Possible soil erosion at exposed building footprints due to higher runoff: ▪ Possible soil erosion at exposed construction sites where the current natural vegetation were removed.

Impact	Risks
	• Construction of industrial complexes, business complexes, tourism complexes, vehicle parking areas, roads etc.: ▪ All impacts on soils during the construction phase will remain during the operational phase. The productive functioning of soil at areas covered by concrete, tar or paving will remain ceased. • Soil erosion due to the clearance of vegetation. • Soil compaction to create foundations for buildings and other associated infrastructure. • Soil pollution due to the incorrect management of chemical substances and dangerous goods. • Soil pollution due to poor waste management (general and hazardous waste). • Soil pollution due to potential spillages from chemical toilets. • Soil pollution due to the incorrect management of concrete mixing. • Soil pollution due to runoff of contaminated stormwater.
Operational Phase	• Possible contamination of soil by spillages of fuel or oil by mechanical equipment: ▪ Possible contamination of soil by spillages of fuel or oil by mechanical equipment, with soil physical and chemical properties being adversely affected. • Use and maintenance of industrial complexes, business complexes, tourism complexes, vehicle parking areas, roads etc.: ▪ All impacts on soils during the construction phase will remain during the operational phase. The productive functioning of soil at areas covered by concrete, tar or paving will remain ceased. • Soil pollution due to the incorrect management of chemical substances and dangerous goods. • Soil pollution due to poor waste management (general and hazardous waste). • Soil pollution due to runoff of contaminated stormwater. • Soil pollution due to leakages from ablution facilities.
Post-Construction and Rehabilitation Phase	• Soil pollution due to hydrocarbon spillages or leakages from vehicles. • Soil erosion due to inefficient rehabilitation of construction areas.
Decommissioning Phase	No decommissioning activities are anticipated or planned for the proposed project. Therefore, no impacts have been identified or assessed as part of this Environmental Impact Assessment process.
Socio-economic	
Construction Phase	• Generation of a large number of job opportunities; and • Potential increase in crime due to the influx of workers, especially during the construction phase. • The stimulation of the local and provincial economy.
Operational Phase	• Generation of a large number of job opportunities. • The stimulation of the local and provincial economy.
Post-Construction and Rehabilitation Phase	• Generation of a number of employment opportunities. • Stimulation of the local economy.
Decommissioning Phase	No decommissioning activities are anticipated or planned for the proposed project. Therefore, no impacts have been identified or assessed as part of this Environmental Impact Assessment process.
Traffic	

Impact	Risks
Construction Phase	• Increase in traffic volumes to the site during both the construction and operational phases.
Operational Phase	• Increase in traffic volumes to the site during both the construction and operational phases.
Post-Construction and Rehabilitation Phase	• Same as under construction phase.
Decommissioning Phase	No decommissioning activities are anticipated or planned for the proposed project. Therefore, no impacts have been identified or assessed as part of this Environmental Impact Assessment process.

Cumulative Impacts

Cumulative Impacts can be defined as the changes experienced within the environment that are caused by an action in combination with past, present and future human actions (environment.gov.za).

Wetlands/Aquatic

- Should mitigation measure not be implemented and changes made to the bed or banks of watercourse unstable channel conditions may result causing erosion, meandering, increased potential for flooding and movement of bed material, which will result in property damage adjacent to and downstream of the site. Reversing this process is unlikely and should be prevented in the first place. Expected to be moderate.
- Construction areas within the watercourses along the proposed servitude can experience an increased alien invasion if mitigation is not implemented or implemented correctly. Regular monitoring should be implemented during construction, rehabilitation including for a period after rehabilitation is completed. Expected to be moderate to high.
- Once in the system it may take many years for some toxins to be eradicated. Expected to be moderate.

Surface and Groundwater

None anticipated.

Fauna

- The proposed development will result in additional avifaunal habitat loss in the region. However, the small area involved means that this impact is minor.
- Increased disturbance at a local scale, but unlikely to be significant.
- Increased road kill mortality at a local scale, but unlikely to be significant.
- Poultry farms, by their nature, elevate the risk of disease transmission between wild and domestic species. However, as long as adequate biosecurity measures are put in place, the cumulative impact should not be cause for concern.

Flora

- Removal of natural, good condition vegetation:
  - Possible erosion of surrounding areas if no mitigation is implemented;
  - Possible increased fragmentation of remaining natural vegetation;
  - Possible bush densification or invasion by alien invasive plant species; and
  - Possible expansion of the chicken farm with additional infrastructure and chicken houses that will increase fragmentation and impact on the vegetation composition and structure.
- Erosion, soil compaction and subsequent sedimentation:
  - Sedimentation;

- Possible bush densification or invasion by alien invasive plant species;
- Further fragmentation of natural habitats;
- Altered topsoil conditions; and
- Potential barren areas remaining after construction.

- Removal of protected species or species of conservation concern:
  - Loss of diversity;
  - Decline in provincial or national numbers of species of conservation concern; and
  - Future expansion of the chicken farm will lead to a further reduction in these species and fragmentation and should therefore be prohibited.
- Invasion by alien invasive plant species:
  - Increase in alien invasive plant species in the area that the site is situated in; and
  - Loss of indigenous species diversity.
- Bush densification:
  - Possible bush densification on the site and loss of indigenous species diversity.
- Deterioration of watercourses and riparian vegetation:
  - Possible loss of the ecological function of riparian vegetation and erosion of riverbanks;
  - Decrease in water quality; and
  - Flooding downstream.

Heritage Resources

- Disturbance or destruction of cultural and heritage resources onsite resulting in a decline in the overall cultural and heritage value of the greater area.

Palaeontological resources

None anticipated.

Air Quality and Noise

None anticipated.

Soil

None anticipated.

Socio-economic

None anticipated.

Traffic

None anticipated.

8. DESCRIPTION OF PROPOSED IMPACT MANAGEMENT ACTIONS (ENVIRONMENTAL MANAGEMENT PROGRAMME ACTIONS)

8.1 Impact Management Outcome and Action Table

Please refer to *Table 10* below.

Table 10: Environmental Management Programme - Impact Management Outcome and Action Table

Aspect	Impact and Nature	Impact Management Outcomes	Impact Management Actions and Statements in order to avoid, modify, remedy, control or stop pollution or environmental degradation	Responsible party/ person(s)
Planning and Design Phase				
Planning and design of the proposed development.	Inadequate planning and design of the proposed development that could result in environmental impacts which could have been avoided.	To effectively plan and design the proposed development in order to minimise operational impacts.	• No activities should take place in the watercourses and associated buffer zones, unless authorised by a Water Use Registration/Licence. • Prevent pedestrian and vehicular access into the watercourse and buffer areas, unless authorised by a Water Use Registration/Licence, by way of adequate design of the proposed development. • An ecologically sound, Storm Water Management Plan must be developed for the proposed development and implemented from the construction phase. • Applicant must appoint an Independent Environmental Control Officer (ECO) to monitor and report on the implementation of the Environmental Management Programme (EMPr). **Watercourses (Witbank Dam/Olifants River):** • Design of structures should aim to have the least impact on the habitat quality and hydrology of the watercourses and should include attenuation structures to contribute to regional flood control and rehabilitation. • The development should take into account the qualified presence of sensitive and protected flora, fauna and avifauna species. • Development on any areas falling within the delineated functional wetland and its recommended buffers is prohibited. • Development below the 1:100 year floodline is prohibited. • Development within, or within 32m, of degraded seepage areas is strictly prohibited. **Aquatic:** • Proper planning and design of the sewerage system should take place prior to construction to avoid sewage spillages. **Flora:** • In order to maintain catchment areas to the moist grassland, use permeable paving within the development. • Development on stands to be zoned as open space is prohibited.	• Applicant • Engineer • Town Planner
Pre-Construction Phase				
Construction site establishment.	Unsafe working conditions.	To ensure that the construction site is operated in a safe and responsible manner for the duration of the construction phase.	• The construction site must be demarcated (fenced or delineated with danger tape). • ECO to monitor the restriction of construction to designated areas. • A site plan must be drawn up by the construction contractor and kept on file. The site plan must show proposed stockpile areas, waste storage areas and ablution facilities. • Signage indicating that the site is a “Construction Site” and indicating the risks associated with the site must be displayed. Emergency numbers, “No-smoking” signs and “No Open Flame” signs must also be displayed at the construction site. • Fire-fighting equipment must be placed at the construction site and must be easily accessible. • The fire-fighting equipment must be maintained on a yearly basis. • Welding, hot-work and flame-cutting may not be conducted close to fuel storage tanks. • Where welding, hot-work and flame-cutting activities are undertaken, fire-fighting equipment must be at hand.	• Applicant • Construction contractor • ECO
Appointment of workers (employees and contractors) to commence construction activities onsite.	Workers being unaware of the impact that their activities may have on the environment.	To adequately educate workers (employees and contractors) regarding environmental awareness.	• Before any employees or contactors commence work at the proposed development, each individual must undergo an Induction Training session that will cover the aspects as detailed in the Environmental Awareness Plan (contained in this EMPr). Attendance registers must be completed and kept on file. • Employees and contract workers must be issued with suitable Personal Protective Equipment (PPE), as applicable to each persons’ job onsite. • All employees must be made aware of the sensitivity of the site and movements must be limited to the designated construction areas (this must be enforced in terms of the contracts of appointment).	• Applicant • Construction contractor
Wetlands				
Construction and Operational Phases				

Aspect	Impact and Nature	Impact Management Outcomes	Impact Management Actions and Statements in order to avoid, modify, remedy, control or stop pollution or environmental degradation	Responsible party/ person(s)
• Compaction of soil; • Removal of vegetation; • Surface water redirection during construction activities; • Development within the Witbank Dam / Olifants River; and • Permanent changes to water flows during the operational phase are related to changes stormwater flows.	Changing the quantity and fluctuation properties of the watercourse by, for example, restricting water flow or increasing flood flows.	To minimise and avoid changes to the quantity and fluctuation properties of the watercourses onsite.	• Before construction activities commence, stands to be zoned as open space and any areas falling within the delineated functional wetland and its recommended buffers as well as areas within the 32m of any degraded seepage areas, and the 1:100 year floodline, must be surveyed on site in consultation with the engineer, Environmental Control Officer, and relevant specialist, and must be clearly demarcated on site for the duration of the construction phase. • The development may not allow channelling and may not cause a damming or draining effect on the water flow upstream. • The development may not lower the base level or increase the gradient of the watercourse or wetland. • Effective stormwater management should be a priority during both construction and operational phase. This should be monitored as part of the EMP. • An environmentally friendly stormwater design should be formulated based on empirical data showing how a neutral effect on the regional hydrograph will be achieved. • High energy stormwater input into the watercourses should be prevented at all costs. Changes to natural flow of water (surface water as well as water flowing within the soil profile) should be considered during the design phase and mitigated effectively. • Implement the principles set out in the South African Guidelines for Sustainable Drainage Systems (SuDS) (Armitage *et al.*, 2013). • Monitoring for local and downstream impacts during the construction as well as operational phases is imperative and should form part of the EMP. • No development should occur within the watercourse and buffer zones, unless authorised by a Water Use Registration/Licence. • No landowner adjacent to wetlands and watercourses, may impede the free movement of wetland or riverine biota by the construction of any barrier that inhibits the continuity of the corridor function. • ECO to monitor contractors' entry into sensitive habitat. • Implement effective rehabilitation to reverse construction related impacts.	• Applicant • Construction contractor • ECO • Engineer • Specialists
• Earthwork activities during construction; • Clearing of surface vegetation will expose the soils, which in rainy events would wash through the watercourse, causing sedimentation. In addition, indigenous vegetation communities are unlikely to colonise eroded soils successfully and seeds from proximate alien invasive trees can spread easily into these eroded soil; • Disturbance of soil surface; • Disturbance of slopes through the	Changing the amount of sediment entering water resource and associated change in turbidity (increasing or decreasing the amount).	To prevent changes to the amount of sediment entering the water resources onsite.	• Before construction activities commence, stands to be zoned as open space and any areas falling within the delineated functional wetland and its recommended buffers as well as areas within the 32m of any degraded seepage areas, and the 1:100 year floodline, must be surveyed on site in consultation with the engineer, Environmental Control Officer, and relevant specialist, and must be clearly demarcated on site for the duration of the construction phase. • The development may not entail channelling and may not cause a damming or draining effect on the water flow upstream. • The development may not lower the base level or increase the gradient of the watercourse or wetland. • Avoid construction related activities in the watercourses and their buffer zones, unless authorised by a Water Use Registration/Licence. • Consider the various methods and equipment available and select whichever method(s) will have the least impact on watercourses. • Water may seep into trenching and earthworks. It is likely that water will be contaminated within these earthworks and should therefore be cleaned or dissipated into a structure that allows for additional sediment input and slows down the velocity of the water, thereby reducing the risk of erosion. Effective sediment traps should be installed. • Construction in and around watercourses must be restricted to the dryer winter months, where possible. • Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction/earthworks in that area (DWAF, 2005). • Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover. • Rehabilitation plans must be submitted and approved for rehabilitation of damage during construction and that plan must be implemented immediately upon completion of construction. • Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers. If necessary, these areas should be fenced off to prevent vehicular, pedestrian and livestock access. • During the construction phase, measures must be put in place to control the flow of excess water so that it does not impact on the surface vegetation. • Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas.	• Applicant • Construction contractor • ECO • Engineer • Specialists

Aspect	Impact and Nature	Impact Management Outcomes	Impact Management Actions and Statements in order to avoid, modify, remedy, control or stop pollution or environmental degradation	Responsible party/ person(s)
creation of roads and tracks adjacent to the watercourse; and • Erosion (e.g. gully formation, bank collapse).			• Runoff from the construction area must be managed to avoid erosion and pollution problems. • Maintain buffer zones to trap sediments. • Monitoring should be done to ensure that sediment pollution is timeously addressed.	
The moving of soil and vegetation resulting in opportunistic invasions after disturbance and the introduction of seed in building materials and on vehicles. Invasions of alien plants can impact on hydrology, by reducing the quantity of water entering a watercourse, and outcompeting natural vegetation, decreasing the natural biodiversity. Once in a system, alien invasive plants can spread through the catchment. If allowed to seed before control measures are implemented, alien plans can easily colonise and impact on downstream users.	Introduction and spread of alien vegetation.	To prevent the introduction and spread of alien vegetation.	• Implement an Alien Plant Control Plan. The control of alien invasive plants should also form part of the Maintenance Plan for the development (ECO to oversee implementation). • Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction/earthworks in that area and returning it where possible afterwards. • Monitor the establishment of alien invasive species within the areas affected by the construction and maintenance and take immediate corrective action where invasive species are observed to establish. • Rehabilitate or revegetate disturbed areas.	• Applicant • Construction contractor • ECO
Direct development within watercourse areas, including crossings.	Loss and disturbance of watercourse habitat and fringe vegetation due to direct development on the watercourse as well as changes in management, fire regime and habitat fragmentation.	To minimise the impact on wetland habitat and fringe vegetation.	• Before construction activities commence, stands to be zoned as open space and any areas falling within the delineated functional wetland and its recommended buffers as well as areas within the 32m of any degraded seepage areas, and the 1:100 year floodline, must be surveyed on site in consultation with the engineer, Environmental Control Officer, and relevant specialist, and must be clearly demarcated on site for the duration of the construction phase. • ECO to oversee the surveying and demarcation of all areas to be zoned as Private Open Space that are prohibited from being developed. • No development should occur within the watercourses and buffer zones, unless authorised by a Water Use Registration/Licence. • The watercourse and its associated buffer zone must be maintained as an ecological corridor and must be kept intact throughout the project lifecycle. • Demarcate the watercourse areas and buffer zones to limit disturbance; clearly mark these areas as no-go areas. • ECO to monitor contractors' entry into sensitive habitat. • Weed control should be implemented in buffer zones. • Monitor rehabilitation and the occurrence of erosion twice during the rainy season for at least two years and take immediate corrective action where needed.	• Applicant • Construction contractor • ECO • Engineer • Specialists

Aspect	Impact and Nature	Impact Management Outcomes	Impact Management Actions and Statements in order to avoid, modify, remedy, control or stop pollution or environmental degradation	Responsible party/ person(s)
			• Monitor the establishment of alien invasive species within the areas affected by the construction activities and take immediate corrective action where invasive species are observed to establish. • Operational activities should not take place within watercourses or buffer zones, nor should edge effects impact on these areas, unless authorised by a Water Use Registration/Licence. • Operational activities should not impact on rehabilitated or naturally vegetated areas.	
Construction and operational activities may result in the discharge of solvents and other industrial chemicals, leakage of fuel/oil from vehicles and the disposal of sewage resulting in the loss of sensitive biota in the wetlands/rivers and a reduction in watercourse function as well as human and animal waste.	Changes in water quality due to pollution.	To minimise the discharge of solvents and other industrial chemicals, the leakage of fuel/oil from vehicles and the disposal of sewage into the environment.	• Provision of adequate sanitation facilities located outside of the watercourse or its associated buffer zone. • Implementation of appropriate stormwater management around the excavations to prevent the ingress of run-off into the excavations and to prevent contaminated runoff into the watercourse. • The development footprint must be fenced off from the watercourses and no related impacts may be allowed into the watercourse e.g. water runoff from cleaning of equipment, vehicle access etc. • Demarcation of material lay down areas must be done before activities commence on site. • After construction, the land must be cleared of rubbish, surplus materials and equipment, and all parts of the land shall be left in a condition as close as possible to that prior to use. • Maintenance of construction vehicles/equipment should not take place within the watercourse or watercourse buffers. • Maintenance of buffer zones to trap sediments with associated toxins. • Control of waste discharges and do not allow dirty water from operational activities to enter the watercourse. • Ensure that no operational activities impact on the watercourse or buffer area, unless authorised by a Water Use Registration/Licence. This includes edge effects and failure of infrastructure, such as sewerage pipes. Implement litter traps at all watercourse crossings. • Treatment of identified pollution should be prioritised accordingly. • Maintain sewerage infrastructure to ensure that leaks are repaired and that leaking sewage does not enter the watercourse.	• Applicant • Construction contractor
Changing the physical structure within a water resource (habitat). Possible sources include: ▪ Encroachment to achieve maximum commercial returns; ▪ Deposition of wind-blown sand; ▪ Loss of fringing vegetation and erosion; ▪ Alteration in natural fire regimes; and ▪ Loss of vegetation	Changes in water resource structure due to construction activities.	To prevent changes to physical structure with water resources.	• Other than approved and authorized structure, no other development or maintenance infrastructure is allowed within the delineated dam or its associated buffer zones. • Demarcate the dam area and buffer zones to limit disturbance, clearly mark these areas as no-go areas. • Linear developments (e.g. roads) should span the watercourse. • Weed control in buffer zone. • Monitor rehabilitation and the occurrence of erosion twice during the rainy season for at least two years and take immediate corrective action where needed. • Monitor the establishment of alien invasive species within the areas affected by the construction and maintenance and take immediate corrective action where invasive species are observed to establish.	• Applicant • Construction contractor
Post-construction and Rehabilitation Phase				
Post-construction and rehabilitation activities.	None anticipated.	Not Applicable.		Not Applicable.
Cumulative Impacts				

Aspect	Impact and Nature	Impact Management Outcomes	Impact Management Actions and Statements in order to avoid, modify, remedy, control or stop pollution or environmental degradation	Responsible party/ person(s)
Changes in the quantity and fluctuation properties of the watercourse.	Construction and operational activities may result in cumulative impact to the water courses within the local catchments and beyond.	To prevent cumulative changes in the quantity and fluctuation properties of the watercourse.	• Implement the mitigation measures as provided under the construction and operational phases. • It is imperative that effective protective measures should be put into place and monitored. A rehabilitation plan should be put into action should any degradation be observed as a result from stormwater or sediment input. Increases in stormwater flows will definitely cause permanent degradation downstream unless mitigated at the design level.	• Applicant • Construction contractor
Changes in sediment entering and exiting the system.	The cumulative impact is expected to be high. Should mitigation measures not be implemented, sediment input may significantly alter the watercourse and downstream watercourses.	To prevent cumulative changes in sediment entering and exiting the system.	• Implement the mitigation measures as provided under the construction and operational phases. Reversing this process is unlikely and should be prevented in the first place.	• Applicant • Construction contractor
Alien vegetation.	The moving of soil and vegetation resulting in opportunistic invasions after disturbance and the introduction of seed in building materials and on vehicles. Once in a system, alien invasive plants can spread through the catchment. If allowed to seed before control measures are implemented, alien plants can easily colonise and impact on downstream users.	To prevent the introduction and spread of alien vegetation.	• Implement the mitigation measures as provided under the construction and operational phases. • Regular monitoring should be implemented during construction and rehabilitation, as well as for a period after rehabilitation is completed.	• Applicant • Construction contractor • ECO/flora specialist
Loss and disturbance of watercourse habitat and fringe vegetation.	The cumulative impact is expected to be moderate. May result in a high degree of irreplaceable loss of resources.	To prevent cumulative loss and disturbance of watercourse habitat and fringe vegetation.	• Implement the mitigation measures as provided under the construction and operational phases.	• Applicant • Construction contractor
Changes in water quality due to pollution.	The cumulative impact is expected to be moderate. Once in the system it may take many years for some toxins to be eradicated.	To prevent cumulative changes in water quality due to pollution.	• Implement the mitigation measures as provided under the construction and operational phases.	• Applicant • Construction contractor
Aquatic				
Construction and Operational Phases				
Increased surface water runoff due to hardened surfaces.	During the construction phase of the proposed development the use of heavy machinery, concrete foundations, compacted ground and impermeable surfaces will result in an increase in hardened surfaces. Hardened surfaces reduce infiltration rates and increase runoff volumes and velocities. The runoff from the construction activities is most likely to end up in the watercourses. This can have impacts downstream where the increase in flow is concentrated; increase the risk of erosion and sedimentation; destroy riparian	To minimise the increase in surface water runoff from hardened surfaces.	• All areas, not directly within the footprint of the development, where soil has been compacted, should be ripped to break up the compacted soil surface. This will aid infiltration and decrease runoff. • Re-vegetation should take place immediately according to the re-vegetation plan. The species utilised for re-vegetation should be endemic to the area, as far as possible and practical, and not include any alien or invasive species. These areas should be monitored to ensure the successful re-establishment of vegetation and to ensure that no erosion gullies form. • All water systems should be sited, designed and operated to restrict the possibility of damage to the riparian or in-stream habitat. • Biomonitoring should be conducted at least once every four months (seasonally) during construction phase. Chemical analysis should occur on a weekly basis during construction phase and thereafter, if down-scaled, it should at least be monitored once a month.	• Applicant • Construction contractor

Aspect	Impact and Nature	Impact Management Outcomes	Impact Management Actions and Statements in order to avoid, modify, remedy, control or stop pollution or environmental degradation	Responsible party/ person(s)
	vegetation; and destabilise watercourses. A decrease in infiltration can also reduce natural recharge to the shallow and groundwater zones and subsequently may impact on the natural watercourses nearby.			
Increased erosion and sedimentation.	Any bare soil resulting from the construction and associated vegetation clearing will be susceptible to erosion, especially during the rainy season. The increase in erosion and dust generation can result in increased sediment loads. Sedimentation will reduce the water quality, which can also affect aquatic life through the smothering of riverine habitat and fish gill clogging.	To minimise erosion and sedimentation.	• Initiate catchment management to control and reduce erosive runoff containing suspended sediment. • Minimise the potential sources of sediment (small particles) from the outset. This means limiting the extent (area) and duration (time period) of land and vegetation disturbance to the minimum required and protecting surfaces once they are exposed. This minimises the potential for storm water disturbances and reduces the sediment loads to receiving streams. • Where site disturbance is significant and unavoidable, undertake proper storm water management planning in accordance with the DWA's Best Practice Guideline documents. • Retain sediments that are picked up on the project site through the use of sediment-capturing devices. On most sites successful erosion and sedimentation control requires a combination of structural (building required) and vegetative (planting required) practices. • Immediate re-vegetation of all bare soil areas should be undertaken. The species utilised for re-vegetation should be endemic to the area, as far as possible and practical, and not include any alien or invasive species. These areas should be monitored to ensure the successful re-establishment of vegetation and to ensure that no erosion gullies form. • The design of water management facilities should include suitable erosion protection measures to ensure that downstream erosion or sedimentation is minimised. • Do not allow loose soil (removed soil) to wash away or blow away – keep the soil covered and place in a secure location. • Access roads to the reed bed system, if any, should be regularly maintained and the roads should have an acceptable surface, be free from erosion damage and have effective drainage, preventing the impounding/ponding of water. • Fences constructed on the construction site should be regularly inspected for signs of erosion and remediated immediately. • Water quality should be monitored regularly according to the monitoring program and appropriate and timeous remedial interventions made in the case of non-compliance.	• Applicant • Construction contractor
Sewage spillages.	Raw sewage will have a severe impact upon the water quality if it enters a river. The sewage contains elevated levels of nutrients (nitrates and phosphates), disease causing bacteria (in particular *E. coli*) and large volumes of waste matter. This will make the water undrinkable. The large amount of waste matter will increase the turbidity and provide a habitat for bacteria to breed and feed on the suspended material. Increases to the turbidity of the water will block out sunlight which is necessary for all forms of life to exist in the water. It also blocks the gills of aquatic organisms, making it difficult for them to breathe as well as hunt and catch food. The excess nutrients	To prevent sewage spillages.	• Proper planning and design should take place prior to construction to avoid sewage spillages. • Development should always be constructed outside of the 1:100 year flood line of the Olifants river or outside of the buffer created for the Witbank Dam, whichever is larger, unless authorised by a Water Use Registration/Licence. • Ablution facilities may not be located within 50m from any watercourse, wetland or riparian zone. • Chemical toilets must be maintained and cleaned on a regular basis. Effluent must be disposed of off-site and into an approved municipal sewage system.	• Applicant • Construction contractor • Engineer

Aspect	Impact and Nature	Impact Management Outcomes	Impact Management Actions and Statements in order to avoid, modify, remedy, control or stop pollution or environmental degradation	Responsible party/ person(s)
	cause massive algal growth, which could result in eutrophication.			
Post-construction and Rehabilitation Phase				
None anticipated.	None anticipated.	Not Applicable.		Not Applicable.
Cumulative Impacts				
Same as under wetlands.	Same as under wetlands.	Same as under wetlands.		Same as under wetlands.
Surface and Groundwater				
Construction and Operational Phases				
Construction and operational activities.	Pollution of surface and/or groundwater resources due to the potential release of pollutants, such as chemicals, especially during the construction phase.	To prevent the release of pollutants into the environment.	• A register must be compiled of all chemical substances and dangerous goods used onsite. • MSDS' (Material Safety Data Sheets) must be maintained for all chemical substances and dangerous goods. The MSDS' must also be displayed onsite. • The chemical substances and dangerous goods must be stored safely and as per the requirements of the MSDS for each chemical substance and dangerous good. Locked storage areas are preferable. • Drip trays must be readily available onsite and used for any repair work, maintenance work of refuelling undertaken onsite. • Spill kits must be readily available onsite and personnel must be trained on the appropriate procedures to clean hydrocarbon spillages. • No wastewater or wash water may be released into the environment from construction activities. • Vehicles should regularly be inspected to ensure that any fuel or oil leaks are repaired.	• Applicant • Construction contractor
Construction and operational activities.	Pollution of surface and/or groundwater resources due to poor waste management.	To ensure that waste (construction waste, general waste and hazardous waste) is managed in an environmentally responsible manner.	• Waste must be managed according to its hazard classification (i.e. general vs. hazardous waste). General and hazardous waste streams should not be mixed. • Waste stored onsite must be kept in appropriate containers with lids that can be closed. • Waste (general and hazardous waste) must be taken to appropriately licensed facilities for reuse, recycling, recovery or disposal. Safe Disposal Certificates must be obtained and kept on record. • Any soil that has been contaminated by oil, diesel or petrol must be regarded as hazardous and disposed of at an appropriately licensed facility. Safe Disposal Certificates must be obtained and kept on record. • No waste may be stored on open soil or within wetlands and/or watercourses. • Sufficient ablution facilities must be provided. • Ablution facilities must be restricted to transformed areas. • Chemical toilet facilities provided onsite must be at a ratio of 1:10 for construction personnel. • Chemical toilets must be serviced regularly and must be provided with toilet paper at all times. • Any spillages from the chemical toilets must immediately be cleaned and the contaminated soil disposed of as hazardous waste. • Construction waste must be stored in a designated area. • Building rubble must be stored separately from domestic waste and may be stored on bare soil as it is inert in nature. It must, however, be ensured that other waste (general and/or hazardous waste) is not mixed together with the building rubble. • Refuse bins must be provided for domestic waste. • Large volumes of waste may not accumulate onsite. • No waste may be burnt or buried onsite. • Building rubble must be kept clean of plastic and brick ties.	• Applicant • Construction contractor
Construction and operational activities.	Pollution of surface and/or groundwater resources due to the incorrect management of chemical substances (fuels, oils etc.).	To ensure the correct management of chemical substances (fuels, oils etc.) onsite.	• Drip trays must be readily available onsite and used for any repair work, maintenance work or refuelling undertaken onsite. • Spill kits must be readily available onsite and personnel must be trained on the appropriate procedures to clean hydrocarbon spillages. • The storage and handling of chemical substances must be in demarcated impermeable and bunded areas.	• Applicant • Construction contractor
Runoff of contaminated stormwater.	Pollution of surface and/or groundwater resources.	To prevent the contamination of storm water.	• Storm water must be diverted around areas where there are pollution sources. • Storm water drainage infrastructure must be regularly inspected for obstructions.	• Applicant

Aspect	Impact and Nature	Impact Outcomes	Management	Impact Management Actions and Statements in order to avoid, modify, remedy, control or stop pollution or environmental degradation	Responsible party/ person(s)
				• No contaminated storm water may be released into the environment from the construction activities. • Washing or cleaning of equipment and machinery must occur in a designated area and the contaminated wash water must be contained. Such an area could be a plastic drum, a leak-proof container or a plastic lined pit. • No construction or any waste material may be dumped into any watercourse. • The current flow regime of watercourses may not be altered. • No surface stormwater generated as a result of the development may be chanelled directly into any wetland or watercourse. • Surface runoff generated during the construction phase must be managed prior to entering any natural drainage system or watercourse . • Stormwater management must be designed to promote infiltration and slow the release of runoff into wetlands and watercourses. • Any point of overland discharge must be located at least 40m away from a watercourse or wetland and overland discharge must occur over areas with a minimum vegetation cover of 80%. • Mechanisms for the dissipation of water energy must be implemented at the beginning of the construction phase. • Increase in downstream peak flows must be mitigated by retaining stormwater until peak flows. • Flow attenuation on site is compulsory. • Attenuation ponds must be sized by an independent hydrological engineer. Attenuation ponds must be sized to reduce their 1:20 year flood discharge to the pre-development levels. • Attenuation/retention ponds must be completed prior to commencement of earthworks. • Stormwater runoff rate must be reduced by using mechanisms such as the construction of earth berms, grassed swales and armourflex lined channels as well as the construction of energy breakers at stormwater outlet structures. • Where erosion at the base of swales or channels and at outlets from piped systems is likely to occur, inverts must be armoured to obviate scour, and where appropriate, swales must be grassed or lined. • Gravel berms must be constructed at the inception of the construction phase to divert upstream catchment runoff, which must be dissipated at the outlet points to return the flow to its pre-development state. • Sediment trapping facilities must be installed prior to the commencement of earthworks. • Overflow protection of kerb inlet structures must be provided in the form of infiltration trenches or grassed swales.	• Construction contractor
Potential release of wastewater (sewage).	Pollution of surface and/or groundwater resources due to the potential release of wastewater (sewage) during the construction and operational phase.	To prevent the release of wastewater (sewage) into the environment.		• All wastewater (sewage) must be collected in appropriate holding/conservancy tanks and may not come into contact with the environment prior to treatment thereof. • The integrity of the sewerage conveyance system components, such as tanks and pumps, must be checked at a frequency as determined by the suppliers. Inspection and maintenance must also be conducted on sewerage pipelines. • Any leaking pipelines must immediately be repaired.	• Applicant • Construction contractor
Resource wastage.	Unsustainable utilisation of water.	To ensure sustainable utilisation of water.		• Regularly inspect reservoirs, water pipes, JoJo tanks and taps for leakages and repair immediately. • Water quality monitoring must be undertaken on the boreholes present onsite. • Consumption of water resources must be monitored.	• Applicant • Construction contractor
Construction activities.	Pollution of surface and/or groundwater resources due to the incorrect management of concrete mixing.	To prevent pollution of surface and/or groundwater resources.		• Concrete should ideally be mixed on an impermeable surface such as a concrete slab. • Cement bags (new and used) must be stored under roof or in closed containers where they will not be exposed to rain. • Dry concrete must be removed and disposed of together with other building rubble. • Ready-mix concrete trucks may clean chutes into foundations, but not elsewhere onsite.	• Applicant • Construction contractor
Construction and operational activities.	Pollution of surface and/or groundwater resources due to sewage spills from chemical toilets and/or leakages from ablution facilities.	To prevent sewage spillages and/or leakages.		• Sufficient ablution facilities must be provided. • Chemical toilets must be serviced regularly. • Any spillages from the chemical toilets must immediately be cleaned and contaminated soil disposed of as hazardous waste. • Ablution facilities must be regularly cleaned. • Should toilets run slowly or become blocked, this should be investigated to ensure that this is not due to a broken or blocked pipe underground. • Any broken or blocked pipes must be repaired.	• Applicant • Construction contractor

Aspect	Impact and Nature	Impact Management Outcomes	Impact Management Actions and Statements in order to avoid, modify, remedy, control or stop pollution or environmental degradation	Responsible party/ person(s)
Post-construction and Rehabilitation Phase				
None anticipated.	None anticipated.	Not Applicable.		Not Applicable.
Cumulative Impacts				
None anticipated.	None anticipated.	Not Applicable.		Not Applicable.
Fauna				
Construction and Operational Phases				
Construction and operational activities.	Loss of exotic species, declared weeds and invader plants.	To promote the eradication of exotic species, declared weeds and invader plants.	• It is recommended that noxious alien trees are eradicated before construction commences. However, inevitably, new gardens will be established by planting exotics. This may ecologically not be puritan, but can be expected to favour an increase of garden birds.	• Applicant • Construction contractor
Construction and operational activities.	Loss of ecologically sensitive and important vegetation units. When expressed as vertebrate habitat, the watercourses are deemed as sensitive and their integrity should not be jeopardized during the construction or operational phases.	To minimise the loss of ecologically sensitive and important vegetation units.	• The area cleared for the proposed project must be kept to a minimum. • Cattle grazing must be contained from the stage when the project is formalised. • All areas designated as sensitive in a sensitivity mapping exercise should be incorporated into an open space system. • The open space system should be managed in accordance with an Ecological Management Plan that complies with the Minimum Requirements for Ecological Management Plans and forms part of the EMP. • The open space system should be fenced off/demarcated prior to construction commencing.	• Applicant • Construction contractor
Construction and operational activities.	Loss of ecosystem function (e.g. reduction in water quality, soil pollution): Storm water run-off from the hard-cover areas of the development could amount to significant volumes inundating the watercourses, unless contained. Unmanaged water masses and the quality can be expected to harm the watercourses and streambeds.	To minimise the loss of ecosystem function.	• Total sealing of paved areas such as parking lots, driveways, pavements and walkways should be avoided. Permeable material should rather be utilised for these purposes. • The crossing of natural drainage systems should be minimised and only constructed at the shortest possible route, perpendicular to the natural drainage system. Where possible, bridge crossings should span the entire stretch of the buffer zone.	• Applicant • Construction contractor • Engineer
Construction activities.	Loss of faunal habitat: The likelihood that the proposed development will displace the biological components of the plains and slopes is high, but the ecological impact of this loss is spatially and ecologically deemed as small.	To minimise the loss of faunal habitat.	• The area cleared for the proposed project must be kept to a minimum. • All areas designated as sensitive in a sensitivity mapping exercise should be incorporated into an open space system. • The open space system should be managed in accordance with an Ecological Management Plan that complies with the Minimum Requirements for Ecological Management Plans and forms part of the EMP. • The open space system should be fenced off/demarcated prior to construction commencing. • The mitigation measures that GDARD (GDACE) (Directorate of Nature Conservation, GDACE, 2008 and 2009) developed for *developments, roads/pipelines/powerlines* and *power lines/telephone lines* are applicable to the proposed development and must be adhered to, where relevant. • The disturbance of nests or breeding activities of birds, reptiles or any other wildlife is strictly prohibited.	• Applicant • Construction contractor
Construction activities.	Loss/displacement of threatened or protected fauna: Few, if any, of the Red Data species still persisting on the terrestrial and rupicolous habitats will survive. These will be displaced in the face of the planned development. Such a loss will be the ultimate stage of a spiral decline of species richness commenced decades ago.	To minimise the loss/ displacement of threatened or protected fauna.	• Natural migration of fauna species should not be hampered and the protection of fauna species should be promoted. • All outside lighting should be directed away from sensitive areas. Fluorescent and mercury vapour lighting should be avoided and sodium vapour (yellow) lights should be used wherever possible. • All storm water structures should be designed so as to block amphibian and reptile access to the road surface. • Should hedgehogs be encountered during the development, these should be relocated (by a suitably qualified specialist) to natural grassland areas in the vicinity of the site. • The contractor must ensure that no fauna species are disturbed, trapped, harmed, hunted or killed during the construction phase. Conservation-orientated clauses should be included in contracts for construction personnel, complete with penalty clauses for non-compliance.	• Applicant • Construction contractor • Engineer
Post-construction and Rehabilitation Phase				

Aspect	Impact and Nature	Impact Management Outcomes	Impact Management Actions and Statements in order to avoid, modify, remedy, control or stop pollution or environmental degradation	Responsible party/ person(s)
None anticipated.	None anticipated.	Not Applicable.		Not Applicable.
Cumulative Impacts				
None anticipated.	None anticipated.	Not Applicable.		Not Applicable.
Flora				
Construction Phase				
• Clearing of vegetation for construction of the township as well as infrastructure; • Access roads; • Illegal disposal and dumping of construction material, such as cement or oil during construction; and • Edge effects from construction.	Destruction of natural vegetation, and deterioration of grassland vegetation.	To prevent the destruction of natura vegetation and deterioration of grassland vegetation.	• Before construction activities commence, stands to be zoned as open space and any areas falling within the delineated functional wetland and its recommended buffers, as well as areas within the 32m of any degraded seepage areas, and the 1:100 year floodline, must be surveyed on site in consultation with the engineer, Environmental Control Officer, and relevant specialist, and must be clearly demarcated on site for the duration of the construction phase. • An independent Ecological Control Officer (ECO) should be appointed to oversee construction activities. • ECO to oversee the surveying and demarcation of all areas to be zoned as Private Open Space that are prohibited from being developed. • ECO to oversee the identification, removal and relocation of plant species of conservation importance. • The construction footprint should incorporate as much grassland as possible into open space planning, especially the area marked as high sensitivity, which contain the highest concentration of plants of conservation concern. • A permanent fence or demarcation must be erected around the construction area to prevent access or edge effects to surrounding environs that will not be developed. • Prohibit vehicular or pedestrian access into natural areas beyond the demarcated boundary of the construction area. • Formalise access roads and make use of existing roads and tracks where feasible, rather than creating new routes through naturally vegetated areas that will not be developed. • Where the localities of provincially protected and threatened plants cannot be avoided by construction, the plants must be removed, where possible and feasible, and either used during rehabilitation or be relocated to dedicated open space or conserved areas. These plants can only be removed and relocated with permission (a permit) from the Mpumalanga Tourism and Parks Agency (MTPA). • Re-vegetate developed areas with indigenous plant species, as far as practical and as soon as possible. This will prevent erosion and invasion by alien invasive plant species. • Plant species of conservation importance (endemic, protected, Red Data) must be identified and marked, and may not be disturbed, or where required, relevant permits plant relocation or removal must be obtained from the relevant authority. • The removal of indigenous vegetation from the watercourse and its associated buffer is prohibited.	• Applicant • Construction contractor • ECO • Engineer • Specialists
Construction activity on the rocky ridge, especially the area where these plants are concentrated.	Destruction of plant species that are 'Declining', 'Rare' or provincially protected.	To prevent the destruction of plant species that are 'Declining', 'Rare' or provincially protected.	• Development on the rocky ridge area is prohibited. • The rocky ridge area must be protected by a buffer. • ECO to monitor contractors' entry into sensitive habitat. • It is recommended that rocky ridge areas be regarded as sensitive due to the concentration of plants of conservation concern in this areas. In addition, the Gauteng Ridge Policy (GDACEL, 2001) should be followed as best practise. This policy discourages development on ridges or rocky outcrops. These areas are characterised by high spatial heterogeneity due to the range of differing aspects (north, south, east, west and variations thereof), slopes and altitudes all resulting in differing soil (e.g. depth, moisture, temperature, drainage, nutrient content), light and hydrological conditions (GDACEL, 2001) and are usually characterised by high biodiversity and therefore their protection contributes to the conservation of biodiversity. According to climate change modelling, level topography will be particularly sensitive to future climate change and major extinction in these areas can be expected (Rutherford *et al.*, 2001). As such, in a landscape affected by climate change, chances for species survival will be higher on ridges (GDACEL, 2011). • Implement a Plant Rescue Plan: Where the plants of conservation concern or provincially protected plants are deemed to be under threat from the construction activity, the plants should be removed by a suitably qualified specialist and replanted into suitable open spaces [this can also be undertaken in collaboration with Operation Wildflower, or the Custodians of Rare and Endangered Wildflowers (CREW)]. These plants may only be removed with the permission of the provincial authority.	• Applicant • Construction contractor • ECO • Engineer • Specialists

Aspect	Impact and Nature	Impact Management Outcomes	Impact Management Actions and Statements in order to avoid, modify, remedy, control or stop pollution or environmental degradation	Responsible party/ person(s)
			• In order to minimise the potential destruction of protected and threatened plants, it is advised that a summer assessment be undertaken to the sensitive areas in order to identify any species flowering or those that might have been overlooked during surveys performed in winter months. • Construction workers may not tamper or remove these plants and neither may anyone collect seed from the plants without permission from the local authority. • If the proposed open spaces cannot be adequately preserved, the plants of conservation concern should be removed (where survival is possible) and relocated. This can only be done once a permit authorising the removal of the plants is granted by the Mpumalanga Tourism and Parks Agency (MTPA). In addition, it is advised that a summer scan (during November) be undertaken to limit the possibility that any plants of conservation concern that were not identified during winter surveys are lost.	
Clearing of the vegetation and change to water runoff patterns and soil hydrology.	• Destruction of moist grassland and deterioration of the vegetation associated with moist grasslands; and • Deterioration of vegetation in moist grasslands due to edge effects, sedimentation, compaction or increased pollutants.	To prevent the destruction of moist grassland and deterioration of the vegetation associated with moist grasslands.	• Before construction activities commence, stands to be zoned as open space and any areas falling within the delineated functional wetland and its recommended buffers, as well as areas within the 32m of any degraded seepage areas, and the 1:100 year floodline, must be surveyed on site in consultation with the engineer, Environmental Control Officer, and relevant specialist, and must be clearly demarcated on site for the duration of the construction phase. • ECO to oversee the surveying and demarcation of all areas to be zoned as Private Open Space that are prohibited from being developed. • ECO to oversee the identification, removal and relocation of plant species of conservation importance. • The minimum buffer zone, as recommended by the wetland specialist, around the moist grassland must be regarded as No-Go areas for the development. Instead, these areas should be incorporated into open space planning, unless authorised by a Water Use Registration/Licence. • In order to maintain catchment areas to the moist grassland, use permeable paving within the development. • Make use of existing roads and tracks, where feasible, rather than creating new routes through moist grassland areas. • Runoff from roads must be managed to avoid erosion and pollution problems. • Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover. • Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas. • Prevent polluted water from reaching the watercourse and surrounding moist grasslands. • An ecologically sound, storm water management plan must be implemented during construction. Ensure that the storm water management of the completed development is adequate to prevent deterioration of the moist grasslands and the Olifants river. • The construction storm water plan could include berms or swales to allow infiltration of rainwater into the soil on the site, thereby retaining the function of the study site as a catchment area for the moist grassland, Olifants river and its tributary. • Do not allow storm water to be canalised. • Prevent contamination of rainwater on the site. • Place and maintain erosion control barriers as appropriate to prevent sedimentation into the watercourse and moist grasslands. • Trucks and equipment should only be washed in dedicated areas and the dirty water is not allowed to discharge into the watercourse or surrounding natural vegetation.	• Applicant • Construction contractor • ECO • Engineer • Specialists
Alien vegetation spreading from existing infestation into disturbed soils as well as the moist grasslands.	Possible increase in exotic and invasive vegetation.	To prevent an increase and spread of exotic and invasive vegetation.	• Implement an Alien Plant Control Plan. The control of alien invasive plants should also form part of the Maintenance Plan for the development (ECO to oversee implementation). • Alien invasive species, especially category 1b invaders, should be removed. By removing these species, the spread of seeds will be prevented into disturbed soils. This could have a positive impact on the surrounding natural vegetation. • All alien seedlings and saplings must be removed as they become evident for the duration of construction. • Manual/mechanical removal is preferred to chemical control. • All construction and operation vehicles and equipment, as well as construction material, should be free of plant material. Therefore, all equipment and vehicles should be thoroughly cleaned prior to access on to the construction areas. This should be verified by the ECO.	• Applicant • Construction contractor • ECO

Aspect	Impact and Nature	Impact Management Outcomes	Impact Management Actions and Statements in order to avoid, modify, remedy, control or stop pollution or environmental degradation	Responsible party/ person(s)
Polluted water reaching the watercourses and moist grassland; and the lack of natural vegetation and the subsequent loss of the ecological function of the vegetation as catchment to the moist grassland and downstream watercourse.	Loss of the ecological function of the moist grasslands.	To prevent the loss of ecological function of moist grasslands.	• Implement an ecologically sound storm water management plan that will allow rainwater within the development to penetrate the soil e.g. via berms or swales as well as permeable paving. • Ensure that the stormwater management system prevents contamination of stormwater and that no polluted water reach the moist grasslands, Witbank Dam and Olifantsriver. • Cordon off the main developed area from the surrounding natural vegetation and moist grasslands to prevent any disturbances into the surrounding areas. • Place and maintain erosion control barriers as appropriate to prevent sedimentation into the watercourse and moist grasslands. • Incorporate the moist grasslands into open space planning and maintenance.	• Applicant • Construction contractor • ECO • Engineer • Specialists
Bush densification.	Increase in bush encroacher species and change in vegetation structure.	To prevent bush encroacher species and change in vegetation structure.	• Leave as much natural vegetation intact as possible. • Do not disturbed soil unnecessary. • Monitor rehabilitation and do not allow grazing to take place until such time that re-vegetation was found to be successful. • Ensure that areas outside of the operational footprint that were disturbed, are adequately rehabilitated and that dense stands of encroacher species are prevented. • Develop a burning, cutting and/or grazing management plant with an ecologist that takes into account safety of the operation, local by-laws and national legislation, in order to effectively manage veld areas.	• Applicant • Construction contractor • ECO
Operational Phase				
Alien vegetation spreading from existing infestation into disturbed soils as well as the watercourses; and exotic plant species from gardens spreading to the rocky grasslands, moist grasslands and subsequently downstream.	Possible increase in exotic and invasive vegetation.	To prevent an increase of exotic and invasive vegetation.	• Alien invasive species that were identified within the study area should be removed prior to construction-related soil disturbances. By removing these species, the spread of seeds will be prevented into disturbed soils which could thus have a positive impact on the surrounding natural vegetation. • Landscaping in the development must make use of indigenous vegetation and no alien invasive plant species should be allowed within home gardens.	• Applicant • ECO
Bush densification.	Increase in bush encroacher species and change in vegetation structure.	To prevent bush encroacher species and change in vegetation structure.	• Monitor the establishment of dense stands of encroacher species and remove as soon as detected. • A rehabilitation plan, using indigenous species from the study area, must be implemented that will restore disturbed areas beyond the footprint of the infrastructure to what it was prior to construction, thereby making the impact on the remainder of the site negligible in the long term.	• Applicant • ECO
Post-construction and Rehabilitation Phase				
None anticipated.	None anticipated.	Not Applicable.		Not Applicable.
Cumulative Impacts				
Construction and operational activities, and resultant soil erosion.	Soil erosion may alter water flow rates, resulting in a cumulative impact on plants within watercourses as well as downstream from the site.	To minimise erosion.	• Implement the mitigation measures as provided under the construction and operational phases for the limiting of erosion. Reversing this process is unlikely and should be prevented in the first place.	• Applicant • Construction contractor
Removal of protected species or species of conservation concern.	Loss of diversity; and Decline in provincial or national numbers of species of conservation concern.	To protect species of conservation concern.	• Implement the mitigation measures as provided under the construction and operational phases for destruction of natural vegetation, and deterioration of grassland vegetation. Reversing this process is unlikely and should be prevented in the first place.	• Applicant • Construction contractor

Aspect	Impact and Nature	Impact Management Outcomes	Impact Management Actions and Statements in order to avoid, modify, remedy, control or stop pollution or environmental degradation	Responsible party/ person(s)
Invasion by alien invasive plant species.	Increase in alien invasive plant species in the area that the site is situated in; and Loss of indigenous species diversity.	To prevent an increase of exotic and invasive vegetation.	• Implement the mitigation measures as provided under the construction and operational phases for increase in exotic and invasive vegetation.	• Applicant • Construction contractor
Bush densification.	Possible bush densification on the site and loss of indigenous species diversity.	To prevent bush encroacher species and change in vegetation structure.	• Implement the mitigation measures as provided under the construction and operational phases for bush densification.	• Applicant • Construction contractor
Deterioration of watercourses and riparian vegetation.	Possible loss of the ecological function of riparian vegetation and erosion of riverbanks; Decrease in water quality; and Flooding downstream.	To prevent the loss of ecological function of moist grasslands.	• Implement the mitigation measures as provided under the construction phase for loss of the ecological function of the moist grasslands.	• Applicant • Construction contractor
Heritage Resources				
Construction and Operational Phase				
Construction and operational activities.	Disturbance or destruction of cultural and heritage resources.	To prevent the disturbance or destruction of cultural and heritage resources.	• The grave site (containing 2 burials – husband and wife) recorded during the Heritage Impact Assessment are older than 60 years of age and protected by the National Cultural Heritage Resources Act. • Mitigation measures outlined by the HIA specialist is: ▪ Preserving In Situ and Managing through a Graves Heritage Management Plan; or ▪ Exhumation and Relocation after detailed Public Participation and the obtaining of relevant permissions. • Should any other unknown objects, sites or features of archaeological nature be uncovered during any development activities, the work in that area shall be halted immediately for inspection and recommendations regarding the way forward. This will include any possible and previously unknown, low stone packed or unmarked graves in the area. **SAHRA requirements:** • If any new heritages resources are discovered during construction and operation phases of the proposed development, then a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the findings at the expense of the developer. • If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required at the expense of the developer. Mitigation will only be carried out after the archaeologist or palaeontologist obtains a permit in terms of section 35 of the NHRA (Act 25 of 1999). The SAHRA APM Unit may be contacted for further details: Nokukhanya Khumalo/Phillip Hine: 021 202 8654. • If any unmarked human burials are uncovered and the archaeologist called in to inspect the finds and/or the police find them to be heritage graves, then mitigation may be necessary and the SAHRA Burial Grounds and Graves (BGG) Unit must be contacted for processes to follow (Thingahangwi Tshivase/Mimi Seetelo: 072 802 1251).	• Applicant • Construction contractor • ECO • Heritage specialist
Post-construction and Rehabilitation Phase				
None anticipated.	None anticipated.	Not Applicable.		Not Applicable.
Cumulative Impacts				
Disturbance or destruction of cultural and heritage resources onsite resulting in a decline in the overall cultural and heritage value of the greater area.	Disturbance or destruction of cultural and heritage resources.	To prevent the disturbance or destruction of cultural and heritage resources.	Implement the mitigation measures as provided under the construction phase.	• Applicant • ECO

Aspect	Impact and Nature	Impact Management Outcomes	Impact Management Actions and Statements in order to avoid, modify, remedy, control or stop pollution or environmental degradation	Responsible party/ person(s)
Palaeontological Resources				
Construction Phase				
Construction and development activities.	Disturbance or destruction of palaeontological resources from: • Earth moving equipment/machinery (front end loaders, excavators, graders, dozers); and • Sealing-in or destruction of fossils by development, vehicle traffic and human disturbance.	To prevent the unregulated/ uncontrolled destruction of fossil assemblages.	• Special care must be taken during the digging, drilling, blasting and excavation of foundations, trenches, channels and footings and removal of overburden not to intrude fossiliferous layers, only if infrastructure is constructed. • It is further suggested that a Section 37(2) agreement of the Occupational, Health and Safety Act (Act No. 85 of 1993) is signed with the relevant contractors to protect the environment and adjacent areas as well as for safety and security reasons. **SAHRA requirements:** • In the event that fossils are uncovered during construction, then construction must cease within the immediate vicinity, a buffer of 30m must be established and a palaeontologist called in to inspect the finds. The palaeontologist must obtain a section 35(4) permit in terms of NHRA and Chapter IV NHRA Regulations, before any fossils are collected.	• Applicant • Construction contractor • ECO
Operational Phase				
None anticipated.	None anticipated.	Not Applicable.		Not Applicable.
Post-construction and Rehabilitation Phase				
None anticipated.	None anticipated.	Not Applicable.		Not Applicable.
Cumulative Impacts				
None anticipated.	None anticipated.	Not Applicable.		Not Applicable.
Air Quality and Noise				
Construction and Operational Phases				
Air pollution.	Generation of dust.	To prevent the generation of dust.	• Implement dust suppression techniques. • Limit vegetation clearance until it is necessary for soil stripping. • A complaints register must be kept onsite and be easily accessible to any party who wishes to lodge a complaint. The complaints register must include the following fields: ▪ The date of the complaint; ▪ The name and surname of the person lodging the complaint; ▪ Details of the complaint; and ▪ How and when the complaint was addressed.	• Applicant • Construction contractor
Air pollution.	Release of emissions from construction vehicles.	To minimise emissions from construction vehicles.	• Regular maintenance of vehicles to minimise the release of emissions.	• Applicant • Construction contractor
Noise pollution.	Generation of nuisance and noise from construction vehicles and equipment/machinery.	To prevent the generation of excessive noise and nuisance.	• Activities that generate the most noise must be scheduled during times of the day that result in the least disturbance to adjacent receptors. • Noisy work must be avoided on weekends and public holidays. • No amplified music is allowed onsite. • Sirens and/or hooters may only be used during emergencies and drills. • Vehicles must not be left idling unnecessarily. • All vehicles must be regularly maintained. • A complaints register must be kept onsite and be easily accessible to any party who wishes to lodge a complaint. The complaints register must include the following fields: ▪ The date of the complaint; ▪ The name and surname of the person lodging the complaint; ▪ Details of the complaint; and ▪ How and when the complaint was addressed.	• Applicant • Construction contractor
Post-construction and Rehabilitation Phase				
None anticipated.	None anticipated.	Not Applicable.		Not Applicable.
Cumulative Impacts				

Aspect	Impact and Nature	Impact Management Outcomes	Impact Management Actions and Statements in order to avoid, modify, remedy, control or stop pollution or environmental degradation	Responsible party/ person(s)
None anticipated.	None anticipated.	Not Applicable.		Not Applicable.
Land Capability and Land Use				
Construction Phase				
Construction of industrial complexes, business complexes, tourism complexes, vehicle parking areas, roads etc.	The current arable, grazing or wilderness land capability will cease completely until the structures are removed. The current land uses will cease completely until the structures are removed (this is not foreseen).	To minimise the impact of a cessation of arable, grazing or wilderness land capability.	• All mitigation measures applied on soils will mitigate land capability, as far as possible.	• Applicant • Construction contractor
Spillages of fuel or oil by mechanical equipment.	Possible contamination of soil by spillages of fuel or oil by mechanical equipment: The soil's physical and chemical properties will be adversely affected and will cause some reduction in land capability.	To prevent fuel and oil spillages.	• All mitigation measures applied on soils will mitigate land capability, as far as possible.	• Applicant • Construction contractor
Construction activities.	Possible soil erosion at exposed building footprints due to higher runoff: Soil erosion will adversely affect land capability.	To minimise soil erosion.	• All mitigation measures applied on soils will mitigate land capability, as far as possible.	• Applicant • Construction contractor
Operational Phase				
Use and maintenance of industrial complexes, business complexes, tourism complexes, vehicle parking areas, roads etc.	The pre-construction land capability at areas covered by concrete, tar or paving will remain ceased.	To minimise the impact of a cessation of land capability in areas covered by concrete, tar or paving.	• All mitigation measures applied on soils will mitigate land capability, as far as possible.	• Applicant
Spillages of fuel or oil by mechanical equipment.	Possible contamination of soil by spillages of fuel or oil by mechanical equipment: The soil's physical and chemical properties will be adversely affected and will cause some reduction in land capability.	To prevent fuel and oil spillages.	• All mitigation measures applied on soils will mitigate land capability, as far as possible.	• Applicant
Post-construction and Rehabilitation Phase				
None anticipated.	None anticipated.	Not Applicable.		Not Applicable.
Cumulative Impacts				
None anticipated.	None anticipated.	Not Applicable.		Not Applicable.
Soil				
Construction Phase				
The construction of structures that cover the soil surface by means of concrete, tar or paving.	• Compaction of the soil surface for building foundations, parking areas etc. will alter the soil's physical properties negatively; and • Covering the soil surface with concrete, tar or paving will cause	To minimise the impact from soil compaction and covering.	• Contain the construction footprint as far as possible. • Prevent removal of the natural vegetation cover where possible. • The development footprint must be optimised to minimise the area that will be compacted during the construction activities. • Soil should be moved when dry, as far as possible. • Excessively heavy vehicles should not be used for earthmoving activities. This will minimise compaction of the soil. • Soils that become compacted as a result of activities from the development must be loosened to an appropriate depth to allow seed germination.	• Applicant • Construction contractor

Aspect	Impact and Nature	Impact Management Outcomes	Impact Management Actions and Statements in order to avoid, modify, remedy, control or stop pollution or environmental degradation	Responsible party/ person(s)
	productive functioning of the soil to cease completely.			
Spillages of fuel or oil by mechanical equipment.	Possible contamination of soil by spillages of fuel or oil by mechanical equipment, with soil physical and chemical properties being adversely affected.	To prevent fuel and oil spillages.	• Construction vehicles and equipment must be checked and maintained regularly to prevent spillages of fuel or oil. • All mechanical equipment must be serviced at an approved facility and at the required service intervals. • All accidental fuel and oil spillages must be cleaned up immediately. • Spill kits must be readily available onsite. • Contaminated soil must be disposed at a suitable disposal facility.	• Applicant • Construction contractor
Construction activities.	Possible soil erosion at exposed building footprints due to higher runoff: • Possible soil erosion at exposed construction sites where the current natural vegetation was removed.	To minimise soil erosion.	• Implement runoff control measures and structures during the first stages of construction, as far as possible. • Contain the construction footprint as far as possible. • Prevent removal of the natural vegetation cover, where possible. • Fences constructed on the construction site should be regularly inspected for signs of erosion and remediated immediately.	• Applicant • Construction contractor
The mixing of concrete.	Soil pollution.	To prevent the contamination of soil during to concrete mixing.	• Concrete should ideally be mixed on an impermeable surface such as a concrete slab. • Cement bags (new and used) must be stored under roof or in closed containers where they will not be exposed to rain. • Dry concrete must be removed and disposed of together with other building rubble. • Ready-mix concrete trucks may clean chutes into foundations, but not elsewhere onsite.	• Applicant • Construction contractor
Incorrect storage practices.	Degradation of topsoil.	To conserve/protect topsoil.	• Topsoil must be stockpiled at height not exceeding 1.5m. • Topsoil must be stored at pre-designed locations for use during rehabilitation and landscaping. • Topsoil and subsoil must be stored on separate stockpiles. • Cover topsoil stockpiles to prevent the soil being washed away during rainfall events. • Topsoil must be replaced during rehabilitation and landscaping.	• Applicant • Construction contractor
Construction of industrial complexes, business complexes, tourism complexes, vehicle parking areas, roads etc.:	The productive functioning of soil at areas covered by concrete, tar or paving will remain ceased.	To minimise the impact from soil compaction and covering.	• Contain construction footprint as far as possible. • Prevent removal of the natural vegetation cover where possible. • Evaluation of the runoff control system and structures. • Rectification where structures are inadequate. • Frequent maintenance where necessary and prompt reparation after damages caused by any nature.	• Applicant • Construction contractor
Soil erosion.	Clearance of vegetation.	To prevent soil erosion.	• Limiting vegetation clearance until it is necessary for soil stripping. • Implement adequate erosion prevention measures, such as measures to dissipate runoff water velocities. • Implement adequate storm water management measures. Soils should be moved when dry, as far as possible. • Excessively heavy vehicles should not be used for earthmoving activities. This will minimise compaction of soil.	• Applicant • Construction contractor
Construction activities.	Soil pollution due to the incorrect management of chemical substances and dangerous goods.	To ensure effective management of chemical substances and dangerous goods.	• Use drip trays for any machinery and/or vehicle repair work. • Immediately repair any leaking machinery or vehicles. • Place oil drums on impermeable surfaces or plastic liners. • Immediately clean any hydrocarbon spillages and dispose of as hazardous waste.	• Applicant • Construction contractor
Poor waste management.	Soil pollution due to poor waste management (general and hazardous waste).	To ensure proper waste management.	• Waste must be managed according to its hazard classification (i.e. general vs. hazardous waste) and general and hazardous waste streams should not be mixed. • Waste stored onsite must be kept in appropriate containers with lids that must be kept closed. • Waste must be taken to appropriately licensed facilities for reuse, recycling, recovery or disposal. • No waste may be stored on open soil or within wetlands and/or watercourses.	• Applicant • Construction contractor
Construction activities.	Soil pollution due to potential spillages from chemical toilets.	To prevent spillages from chemical toilets.	• Sufficient ablution facilities must be provided. • Chemical toilets must be serviced regularly.	• Applicant • Construction contractor

Aspect	Impact and Nature	Impact Management Outcomes	Impact Management Actions and Statements in order to avoid, modify, remedy, control or stop pollution or environmental degradation	Responsible party/ person(s)
			• Any spillages from the chemical toilets must immediately be cleaned and the contaminated soil disposed of as hazardous waste. Safe Disposal Certificates must be obtained and kept on record.	
Construction activities.	Soil pollution due to runoff of contaminated stormwater.	To ensure proper management of stormwater.	• Storm water must be diverted around areas where there are pollution sources. • Storm water drainage infrastructure must be regularly inspected for obstructions. • No contaminated storm water may be released into the environment from the construction activities. • Washing or cleaning of equipment or machinery must occur in a designated area and the contaminated wash water must be contained. Such an area could be a plastic drum, a container or a plastic lined pit.	• Applicant • Construction contractor
Operational Phase				
Use and maintenance of industrial complexes, business complexes, tourism complexes, vehicle parking areas, roads etc.	All impacts on soils during the construction phase will remain during the operational phase. The productive functioning of soil at areas covered by concrete, tar or paving will remain ceased.	To minimise the adverse impacts on the soil.	• Evaluation of the runoff control system and structures. Rectification where structures are inadequate. • Frequent maintenance where necessary and prompt reparation after damages caused by any nature.	• Applicant • Engineer
Contamination of soil by spillages of fuel or oil by mechanical equipment.	Contamination of soil by spillages of fuel or oil by mechanical equipment, with soil physical and chemical properties being adversely affected.	To prevent soil contamination.	• Spill kits must be readily available on site. • All accidental fuel and oil spillages will be cleaned up immediately. • Contaminated soil will be disposed at a suitable disposal facility. • All mechanical equipment will be serviced at an approved facility.	• Applicant
Operational activities.	Soil pollution due to the incorrect management of chemical substances and dangerous goods.	To ensure effective management of chemical substances and dangerous goods.	• Use drip trays for any machinery and/or vehicle repair work. • Immediately repair any leaking machinery or vehicles. • Place oil drums on impermeable surfaces or plastic liners. • Immediately clean any hydrocarbon spillages and dispose of as hazardous waste.	• Applicant
Poor waste management.	Soil pollution due to poor waste management (general and hazardous waste).	To ensure proper waste management.	• Waste must be managed according to its hazard classification (i.e. general vs. hazardous waste) and general and hazardous waste streams should not be mixed. • Waste stored onsite must be kept in appropriate containers with lids that must be kept closed. • Waste must be taken to appropriately licensed facilities for reuse, recycling, recovery or disposal. • No waste may be stored on open soil or within wetlands and/or watercourses.	• Applicant
Operational activities.	Soil pollution due to runoff of contaminated stormwater.	To ensure proper management of stormwater.	• Storm water must be diverted around areas where there are pollution sources. • Storm water drainage infrastructure must be regularly inspected for obstructions. • No contaminated storm water may be released into the environment from the construction activities. • Washing or cleaning of equipment or machinery must occur in a designated area and the contaminated wash water must be contained. Such an area could be a plastic drum, a container or a plastic lined pit.	• Applicant
Operational activities.	Soil pollution due to leakages from ablution facilities.	To minimise possibility of leakages from ablution facilities.	• Sufficient ablution facilities must be provided. • Chemical toilets must be serviced regularly. • Any spillages from the chemical toilets must immediately be cleaned and the contaminated soil disposed of as hazardous waste. Safe Disposal Certificates must be obtained and kept on record.	• Applicant
Post-construction and Rehabilitation Phase				
Rehabilitation activities.	Soil erosion due to inefficient rehabilitation of construction areas.	To prevent soil erosion.	• Rehabilitation must already be initiated during the construction phase, where possible. • Areas for rehabilitation must be cleared of any building rubble and/or debris before rehabilitation is commenced with. • Soil should be moved when dry, as far as possible. • Weeds must be removed prior to soil replacement. • Areas under rehabilitation must be cordoned off to prevent pedestrian and vehicular access. • Re-vegetation must be undertaken using indigenous species, as far as possible. • Areas under rehabilitation must be monitored to ensure successful vegetation establishment. Organic fertilizers and topsoil should be added to areas where vegetation establishment is not effective.	• Applicant • Construction contractor

Aspect	Impact and Nature	Impact Management Outcomes	Impact Management Actions and Statements in order to avoid, modify, remedy, control or stop pollution or environmental degradation	Responsible party/ person(s)
Cumulative Impacts				
None anticipated.	None anticipated.	Not Applicable.		Not Applicable.
Socio-economic				
Construction and Operational Phases				
Construction and operational activities.	Generation of a large number of job opportunities.	This is a positive impact and no mitigation measures are therefore required.		Not applicable.
Construction and operational activities.	Stimulation of the local economy.	This is a positive impact and no mitigation measures are therefore required.		Not applicable.
Construction and operational activities.	Potential increase in crime due to the influx of workers, especially during the construction phase.	To prevent an increase in incidents of crime in the area.	• Reference checks should be conducted on all workers before they are appointed. • Workers should not be allowed to leave the construction site during the day and should be transported to and from the site on a daily basis.	• Applicant • Construction contractor
Post-construction and Rehabilitation Phase				
None anticipated.	None anticipated.	Not Applicable.		Not Applicable.
Cumulative Impacts				
None anticipated.	None anticipated.	Not Applicable.		Not Applicable.
Traffic				
Construction and Operational Phases				
Construction and operational activities.	Increase in traffic volumes to the site.	To minimise the effect of an increase in traffic volumes.	• Drivers must adhere to all speed restrictions and road rules. • Routing of vehicles must take other road users into account. • Load restrictions must be adhered to. • Avoid using access roads during peak times, as far as possible. • Loads must be securely fastened.	• Applicant • Construction contractor • HOA
Post-construction and Rehabilitation Phase				
Rehabilitation activities.	Increase in traffic volumes to the site.	To minimise the effect of an increase in traffic volumes.	• Drivers must adhere to all speed restrictions and road rules. • Routing of vehicles must take other road users into account. • Load restrictions must be adhered to. • Avoid using access roads during peak times, as far as possible. • Loads must be securely fastened.	• Applicant • Construction contractor
Cumulative Impacts				
None anticipated.	None anticipated.	Not Applicable.		Not Applicable.

8.2 Applicable Environmental Management Standards and Practices

Biomonitoring should be conducted at least once every four months (seasonally) during construction phase. Chemical analysis should occur on a weekly basis during construction phase and thereafter, if down-scaled, it should at least be monitored once a month.

8.3 Applicable provisions of the NEMA, 1998, as amended, regarding closure

The provisions of NEMA, 1998, pertaining to closure are not applicable to this proposed development as the development does not include the prospecting, exploration or extraction of a mineral or petroleum resource.

8.4 Applicable provisions of the NEMA, 1998, as amended, regarding financial provision for rehabilitation

The provisions of NEMA, 1998, pertaining to financial provision for rehabilitation are not applicable to this proposed development as the development does not include the prospecting, exploration or extraction of a mineral or petroleum resource.

8.5 Method of monitoring the implementation of the impact management actions

Construction Phase

An independent Environmental Control Officer (ECO) must be appointed to conduct monthly compliance audits during the construction phase of the proposed development. The audits must verify compliance with the Environmental Authorisation and this Environmental Management Programme and a formal report must be compiled after each audit. The reports must be submitted to the Competent Authority. Once the construction phase has been completed, a post-construction audit must be conducted by the independent ECO and the report also submitted to the Competent Authority.

Post-construction and Rehabilitation Phase

An independent Environmental Control Officer (ECO) must be appointed to oversee all rehabilitation activities and conduct monthly compliance audits throughout the rehabilitation phase of the proposed development. The audits must verify compliance with the Environmental Authorisation and this Environmental Management Programme and a formal report must be compiled after each audit. The reports must be submitted to the Competent Authority. Once the rehabilitation phase has been completed, a post-rehabilitation audit must be conducted by the independent ECO and the report also submitted to the Competent Authority.

Operational Phase

An internal ECO must be appointed to conduct monthly compliance audits during the operational phase of the proposed development and to ensure that corrective actions are implemented where required. Reports resulting from these audits do not need to be submitted to the Competent Authority.

An independent ECO must be appointed to conduct annual compliance audits during the operational phase of the proposed development. The audits must verify compliance with the Environmental Authorisation and this Environmental Management Programme and must comply with the requirements of Appendix 7 of the Environmental Impact Assessment Regulations of 2014, as amended. A formal report must be compiled after each audit and the reports must be submitted to the Competent Authority.

8.6 The frequency of monitoring the implementation of the impact management actions

Construction Phase

Monthly independent ECO compliance audits.

Post-construction and Rehabilitation Phase
Monthly independent ECO compliance audits.

Operational Phase
Monthly internal ECO compliance audits and annual external ECO compliance audits.

8.7 Persons who will be responsible for the implementation of the impact management actions

The applicant is ultimately responsible for the implementation of the impact management actions, during all phases of the development, even where the implementation of the actions may be contracted out to a third party. During the construction phase, sub-contractors will for the most part be carrying out the required impact management actions and these actions should therefore be adequately communicated to the contractors. It is recommended that this document forms part of the tender documentation and contract documentation for all contractors. During the operational phase, the applicant will mostly be responsible for carrying out the required impact management actions.

The applicant must appoint a designated person for the function of internal/in-house ECO and an external, suitably qualified Environmental Assessment Practitioner for the function of external, independent ECO.

The appointed external ECO must maintain the following on site:

- A site dairy;
- Copies of all reports submitted to the Department; and
- A complaints register of all public complaints and the remedies applied to such complaints.

The ECO to remain employed until all rehabilitation measures, as well as site clean-up, are completed and the site is handed over to the applicant by the contractor for operation.

8.8 Time periods within which the impact management actions must be implemented

Planning and Design Phase
The management actions for the Planning and Design Phase must be completed before the Pre-construction Phase is commenced with.

Pre-construction Phase
The management actions for the Pre-construction Phase must be completed before the Construction Phase is commenced with.

Construction Phase
The management actions for the Construction Phase must be completed prior to the completion of the Construction Phase (i.e. before the Operational Phase is commenced with).

Operational Phase
The management actions for the Operational Phase must be implemented during the Operational Phase, on a continual basis.

Post-construction and Rehabilitation Phase
The management actions for the Post-construction and Rehabilitation Phase must be completed within one year from the completion of the Construction Phase.

8.9 Mechanism for monitoring compliance with the impact management actions

Please refer to Sections 8.5 and 8.6 of this EMPr.

8.10 Program for reporting on compliance, taking into account the requirements as prescribed by the EIA Regulations, 2014, as amended

Table 11: Reporting program

Type of reporting	Reporting Frequency	Authority to report to
Construction Phase		
Monthly independent ECO compliance audits	Monthly, for the duration of the construction phase	Competent Authority (MDARDLEA)
Post-construction phase independent ECO compliance audit	Once-off, upon completion of the construction phase	Competent Authority (MDARDLEA)
Post-construction and Rehabilitation Phase		
Monthly independent ECO compliance audits	Monthly for the duration of the rehabilitation phase	Competent Authority (MDARDLEA)
Post-rehabilitation phase independent ECO compliance audit	Once-off, upon completion of the rehabilitation phase	Competent Authority (MDARDLEA)
Operational Phase		
Monthly independent ECO compliance audits	N/A – Internal reporting	N/A – Internal reporting
Annual external ECO compliance audits	Yearly	Competent Authority (MDARDLEA)

9. ENVIRONMENTAL AWARENESS PLAN

The applicant will ensure that its employees are adequately informed of the environmental risks that may result from work that they conduct onsite and how these risks must be dealt with in order to avoid pollution or the degradation of the environment, through the implementation of this Environmental Awareness Plan.

The Environmental Awareness Plan for the proposed project consists of two parts, namely, initial Induction Training and ongoing job-specific, Toolbox-talk Training. The same training material will be utilised during both the Induction Training and Toolbox-talk Training.

Induction Training

Before any employees or contactors commence work at the proposed development, each individual must undergo an Induction Training session. This is required during the following phases of the proposed project:

- Pre-Construction phase;
- Construction phase;
- Post-construction and rehabilitation phase; and
- Operational phase.

An attendance register must be kept by N&H Golden Miles Village Close Corporation and each individual who has completed the Induction Training must complete the attendance register. This will also function as an acknowledgement that each individual has understood the training received.

Toolbox-talk Training

Toolbox-talk Training must be conducted biannually during the operational phase of the proposed development and all operational employees must attend these sessions. An attendance register must be kept by N&H Golden Miles Village Close Corporation and each individual who has completed the Toolbox-talk Training must complete the attendance register. This will also function as an acknowledgement that each individual has understood the training received.

Training Material

The same material will be used for both the Induction Training and Toolbox-talk Training sessions and will cover the following topics:

- What is meant by the term "environment";
- Why the environment requires protection;
- The environmental risks that may result from work that is performed at the proposed project/development during the above mentioned phases of the project;
- How the identified risks may impact upon the environment;
- How the identified risks can be mitigated;
- The protection of workers who refuse to do environmentally hazardous work, as provided for in the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended;
- Environmental Management Programme conditions that are specifically applicable to employee's work onsite;
- Fire-fighting procedures; and
- Hydrocarbon spill response procedure, including spill kit usage training.

The training can be presented in a verbal format if required.

10. SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

No specific information has been required by the Competent Authority at this stage of the application process.