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THE PROPOSED MINNEBRON X 1 MIXED USE DEVELOPMENT

(on Portions 523-524, 165 and part of the Remainder of Portion 3 of the Farm Witpoortjie 117 I.R)

Plan of Study for the Environmental Impact Assessment

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PLAN OF STUDY FOR EIA FOR THE PROPOSED MINNEBRON X 1 MIXED USE DEVELOPMENT

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CONTENTS PAGE

ABBREVIATIONS

EBOSS	Ekurhuleni Biodiversity and Open Space Strategy
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMM	Ekurhuleni Metropolitan Municipality
EMP	Environmental Management Plan
EMSDF	Ekurhuleni Metropolitan Spatial Development Framework
GDARD	Gauteng Department of Agriculture and Rural Development
IDP	Integrated Development Plan
NEMA	National Environmental Management Act
NER	National Energy Regulator
RED	Regional Electricity Distributor
SAHRA	South African Heritage Resources Agency
SIA	Social Impact Assessment

1. INTRODUCTION

1.1 Project introduction and background

Ekurhuleni Metropolitan Municipality (EMM) has appointed Galago Environmental CC: Environmental Consultants and Specialists as the independent environmental consultants to identify and assess the potential environmental impacts associated with the proposed establishment of the **Minnebron x 1 Mixed Use Development** on Portions 523-524 and part of the Remainder of Portion 3 of the Farm Witpoortjie 117 I.R. through an Environmental Impact Assessment (EIA) process.

The EIA process is prescribed by Chapter 5 of the Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the 2014 Environmental Regulations published as GN No. R. 982-985. A Scoping Assessment Process must be undertaken for activities as listed in Regulation No. R. 984 that may have a significant impact on the environment.

This plan of study for the Environmental Impact Assessment is prepared to meet the requirements for a plan of study as prescribed in Regulation 22 (a) and Appendix 2 (2)(i) of Government Notice R982 promulgated in terms of chapter 5 of the National Environmental Management Act, 1998 (Act No 107 of 1998):

Appendix 2 (2)(i): a plan of study for undertaking the environmental impact assessment process to be undertaken, including-

- *(i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;*
- *(ii) a description of the aspects to be assessed as part of the environmental impact assessment process;*
- *(iii) aspects to be assessed by specialists;*
- *(iv) a description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists;*
- *(v) a description of the proposed method of assessing duration and significance;*
- *(vi) an indication of the stages at which the competent authority will be consulted;*
- *(vii) particulars of the public participation process that will be conducted during the environmental impact assessment process; and*
- *(viii) a description of the tasks that will be undertaken as part of the environmental impact assessment process;*
- *(ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.*

1.2 Description of alternatives

The National Department of Environmental Affairs stresses that the no-go option be considered as a base case against which to measure the relative performance of the other alternatives. The impacts of other alternatives are expressed as changes to the base case or status quo. If considered viable the decision not to act may be considered in the

evaluation and assessment process against the other alternatives. The following table (Table 1) describes the different alternatives that can be investigated in more detail during the EIA phase and comments on potential.

Table 1: The different alternatives that can be investigated in more detail during the EIA phase and comments on potential

Alternatives	Description	Comments on project implementation
Activity alternatives	Alternatives to considering other activities to address the same ends	A short summary of activity alternatives will be included in section 1.2.1
Location or site alternatives	The property on which the proposal is intended and possible location for certain activities within the property. This can also include other sites to commission the project.	Site alternatives were investigated by the EMM during the feasibility phase of the project. Sites with significant environmental sensitivities were excluded from further investigations. The remaining sites are now going through EIA processes to consider the environmental impacts.
Layout / Design alternatives	Placement of land uses and infrastructure within the area available for development to optimise the site and also provide environmental safeguard to sensitive features identified. Design alternatives could also include different architectural designs of housing units, engineering designs of infrastructure services and roads	These alternatives will be investigated during the EIA phase after the finalization of all the specialist studies. The layout will attempt to avoid environmentally sensitive areas.
Scale alternatives	Refers to actual size of the development proposed and social housing components.	Scale alternatives will be investigated during the EIA phase after the finalization of all the specialist studies.
Technology alternatives	The use of solar instead of electricity to diminish the demand on the municipal electricity provision must be considered.	Technology alternatives will be investigated during the EIA phase after the finalization of all the specialist studies.
Land use alternatives	Consideration of alternative land uses on the development site aside from housing.	A short comparable analysis of land use alternatives follow in section 1.2.1
No-go option	The status quo remains and no development takes place.	The no-go option will be investigated in section 1.2.2

1.2.1 Land use/activity alternatives

Activity alternatives were investigated during the feasibility phase of the project and site alternatives will not be further investigated since the applicant is the landowner and has no other land available for residential development in the area (Table 2).

Table 2: A comparable summary of the activity alternatives

Activity	DISQUALIFYING CONSIDERATIONS
Industrial / Commercial development	The current demand in Ekurhuleni Municipality is for mixed use residential developments that include some land for commercial use.
Agriculture	The site has been earmarked for housing and does not have a high agriculture potential.
Residential Development	There is a tremendous need for housing in the area. The site is on the edge of existing development and the expansion of the infrastructure can be easily incorporated. There is already a road network for easy access to the surrounding areas.

1.2.2 No-go alternative

The situation where the environment is left in the present condition and no interference is attempted; therefore the status quo is maintained.

Should this site not be developed the housing shortage in the area would increase the demand for resources in the area. Illegal hunting and harvesting of medicinal plants on the site could then further reduce the biodiversity on site. The housing shortage also places increasing demand on infrastructure and the social environment of the surrounding area. The schools and health facilities are not designed to deal with the influx of informal settlers. There would be no proper water and sanitation facilities, electricity provision or waste disposal at squatter camps, should they establish on site, causing health hazards for the residents of the area.

At present there is uncontrolled access to the site, causing increased dumping on the site and a risk of a squatter camp establishing on the site. This situation has an increasing security risk for vagrants that could impact on surrounding properties.

1.3 Specialist Studies and Reports

The identification and assessment of environmental impacts during the Scoping phase reveals the following potentially significant environmental aspects which require further detailed assessment:

- **Geotechnical:** The implications of the geology and different soil types on site will be investigated in detail during the geotechnical study in order to determine the best possible mitigation measures for construction as well as for the placement of the infrastructure.
- **Flora and Fauna (Mammal, Avifauna and Herpetofauna):** A specialist flora/fauna/avifauna study will be undertaken to determine sensitive areas and impacts on red listed plant and faunal species on site.
- **Wetland:** A Wetland delineation study will be undertaken to determine potential wetland areas on site and their proposed buffer areas
- **Socio/Economics:** A specialist study will not be undertaken on the impacts of the proposed development on the socio/economics of the area, since these impacts are available and the need for housing proven.

- **Cultural / Historical Heritage:** A cultural heritage assessment will be undertaken to assess any findings such as graves and whether there are any structures older than sixty years on the study site.
- **Traffic:** A Traffic impact study will be undertaken to determine potential impacts associated with increased traffic from the proposed development and public transport.
- **Bulk Services and Infrastructure, including stormwater:** A services report will study the potential for services in the area and what will have to be done by EMM to provide infrastructure to the proposed development. The stormwater management plan will look at stormwater infrastructure provision in the area.
- **Air Quality:** An Air Quality Study, including radon will be carried out in order to determine the potential impact of the mine tailings dam west of the site on the surrounding environment.
- **Town Planning:** A Town Planning study will be completed and will indicate the housing types, sizes and quantities as well as all other community facilities and open space areas.

1.3.1 Geotechnical

The ultimate objective of the investigation is to assess the impact that the construction of the structures will have on the soil and surrounding environment, in order to ameliorate negative influences.

The assessment will cover the following key aspects:

- Description of the site topography and drainage in the study area.
- Description of the site geology and soils in the study area.
- Description of the slope stability, collapse/swell/erosion potential, sub-soil seepage and percolation properties.

The purpose of the investigation will be to provide information on the nature and geotechnical properties of the shallow soils encountered on the site

Methodology:
The following action steps will be followed in the investigation:

- Determine whether any soil problems were present at the site that would have an effect on either founding or construction methods for structures.
- To delineate the site into appropriate geotechnical zones according to any essential differences in founding conditions encountered.
- To evaluate the founding conditions at the site and to recommend building precautions if necessary for the different geotechnical zones.
- To obtain basic data concerning the use of the in situ materials for guideline purposes
- Geotechnical investigation to be carried out in accordance with the specification for geotechnical site investigations for housing developments (National Department of Housing specification GFSH-2) as well as the South African. National Standard for Profiling, Percussion Borehole and Core Logging in Southern Africa (SANS 633:2009).

1.3.2 Flora

The flora specialist study will have the following objectives:

- Determine relatively homogeneous potential ecological units / plant communities / ecosystems on recent aerial photographs.
- Determine the broad habitat features within each homogeneous unit.
- List the plant species (trees, shrubs, grasses and herbaceous species of special interest) present in each ecological unit for plant community and ecosystem description.
- Identify potential red data plant species, possible encroacher species and exotic plant species.
- Identify potential habitat for the red data species that may be present in the area.

Methodology:
The vegetation / habitats will be stratified into relatively homogeneous units on recent Google images of the area. At several sites within each relatively homogeneous unit a description of the dominant and characteristic species will be made. These descriptions are based on total floristic composition, following established vegetation survey techniques (Mueller-Dombois & Ellenberg 1974; Westhoff & Van der Maarel 1978). Data recorded will include a list of the plant species present, including trees, shrubs, grasses and forbs. Comprehensive species lists will therefore be derived for each plant community / ecosystem present on the site. These vegetation survey methods have been used as the basis of a national vegetation survey of South Africa (Mucina *et al*. 2000) and are considered to be an efficient method of describing vegetation and capturing species information. Notes will additionally be made of any other features that might have an ecological influence.

The identified systems will not only be described in terms of their plant species composition, but also evaluated in terms of the potential habitat for red data plant species.

Critically Endangered, Endangered, Vulnerable and Protected Species (NEMBA species, TOPS species) will be evaluated against the list published in Department of Environmental Affairs and Tourism Notice No. 2007 (National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)).

Protected trees will be identified in accordance with the list of nationally protected trees published in Government Notice No. 29062 3 (2006) (National Forests Act, 1998 (Act No. 84 0f 1998), as Amended (Department of Water Affairs Notice No 897, 2006).

Red data plant species for the area will be obtained from the SANBI data bases, with updated threatened status, (Raimondo *et al* 2009). These lists will then be evaluated in terms of habitat available on the site, and also in terms of the present development and presence of man in the area.

Alien invasive species, according to the Conservation of Agricultural Resources Act (Act No.43 of 1983) as listed in Henderson (2001), are indicated.

Medicinal plants will be indicated according to Hutchings *et al.* (1996), Van Wyk, Van Oudthoorn & Gericke (1997).

1.3.3 Fauna - Mammals

The fauna specialist study will have the following objectives:

- To identify any environmental fatal flaws or red flag issues;
- To qualitatively and quantitatively assess the significance of the mammal habitat components and current conservation status of the study site;
- Identify and comment on ecological sensitive areas and ecological services;
- Comments on connectivity with natural vegetation and habitats along a 500 m zone on adjacent terrain;
- To provide a list of mammals that occur or might occur, and to identify species of conservation importance;
- To highlight potential impacts of the proposed development on the mammals of the study site;
- To provide management recommendations to mitigate negative and enhance positive impacts should the proposed development be approved; and
- Calculate and comment on significant ratings for the proposed development.

Methodology:
A site visit will be conducted during which the observed and derived presence of mammals associated with the recognised habitat types will be recorded. This will be done with due regard to the well recorded global distributions of Southern African mammals, coupled to the qualitative and quantitative nature of recognised habitats. The 500 m of adjoining properties will be scanned for important fauna species and habitats. During the site visit mammals will be identified by visual sightings through random transect walks. No trapping or mist netting will be conducted. In addition, mammals will be identified by means of spoor, droppings, burrows or roosting sites.

Three criteria will be used to gauge the probability of occurrence of mammals on the study site. These include known distribution range, habitat preference and the qualitative and quantitative presence of suitable habitat.

Distributional ranges and the presence of suitable habitats will be used to deduce the presence or absence of species based on authoritative tomes, scientific literature, field guides, atlases and databases. This will be done irrespective of season.

1.3.4 Fauna - Herpetofauna

The fauna specialist study will have the following objectives:

- To qualitatively and quantitatively assess the significance of the herpetofaunal habitat components and current general conservation status of the property;
- To identify and comment on ecologically sensitive areas;
- To comments on connectivity with natural vegetation and habitats on adjacent sites;
- To provide a list of herpetofauna which occur or might occur, and to identify species of conservation importance;

- To highlight potential impacts of the proposed development on the avifauna of the study site; and
- To provide management recommendations to mitigate negative and enhance positive impacts should the proposed development be approved.

Methodology:
A site visit will be conducted during which the observed and derived presence of reptiles and amphibians associated with the recognised habitat types of the study site will be recorded. This will be done with due regard to the well-recorded global distributions of Southern African herpetofauna, coupled with the qualitative and quantitative nature of recognised habitats. The 500 m of adjoining properties will be scanned for important fauna species and habitats. During site visits, reptiles and amphibians will be identified by sightings through random transect walks. Amphibian diversity will also be established by means of acoustic identification. No trapping will be conducted.

Distributional ranges and the presence of suitable habitats will be used to deduce the presence or absence of species based on authoritative tomes, scientific literature, field guides, atlases and databases. This will be done irrespective of season.

1.3.5 Avifauna

The Avifauna specialist study will have the following objectives:

- To qualitatively and quantitatively assess the significance of the avifaunal habitat components, and current general conservation status of the property;
- To comment on ecologically sensitive areas;
- To comments on connectivity with natural vegetation and habitats on adjacent sites;
- To highlight potential impacts of the proposed development on the avifauna of the study site; and
- To provide management recommendations to mitigate negative and enhance positive impacts should the proposed development be approved.

Methodology:
A site visit will be conducted to identify possible sensitive avifaunal habitat systems. During the site visit, observed and derived presence of red Data avifaunal species associated with the recognised habitat types of the study site, will be recorded.

Birds will be identified visually during field surveys, using 10x42 Bushnell Legend binoculars and a 20x-60x Pentax spotting scope, and by call, and where necessary will be verified from Sasol Birds of Southern Africa (Sinclair et al., 2011) and Southern African Bird Sounds (Gibbon, 1991). The 500 m of adjoining properties will be scanned for important avifaunal species and habitats.

Desktop surveys will be used to determine the presence of suitable habitats to deduce the likelihood or presence or absence of Red Data avifaunal species, based on authoritative tomes, scientific literature, field guides, atlases and databases. This will be done irrespective of season.

1.3.6 Wetland delineation

The report will conform to the requirements of the Department of Water Affairs and Forestry and the Gauteng Department of Agriculture and Rural Development (GDARD) and will include the following:

- Brief description of the natural environment that has an impact on wetland formation; climate, rainfall and temperature, soil conditions and vegetation;
- Present ecological status of the wetland;
- Discussion of aspects determining wetland formation;
- Wetland delineation, and;
- Conclusions and findings.

This assessment focused on the delineation of wetlands using four main indicators: terrain unit, vegetation, soil wetness and soil form. The soil indicators (wetness and form) were the primary determinants of delineation, which is widely regarded as the most accurate method. The vegetation was used as a confirmatory indicator of wetlands.

Methodology:
The procedure followed was as follows:

- Aerial photography to determine possible wetlands;
- Terrain unit study to determine where wetlands are most likely to occur;
- Identification of hydromorphic (wetland) soils, soil form and wetness indicators; to establish permanent, seasonal, and temporary wetland zones.
- Soils are classified in accordance with the Binomial Classification System for Southern Africa (Soil Classification Working Group, 1991, revised 2016). Initial delineation of the soil forms will take into account the following: vegetation type, terrain form, colour and texture of the soil. The boundaries are then refined through soil auger and or soil probe. All qualifying soil forms are then investigated in more detail;
- Starting at the wetland edge, a probe is used to investigate the soil profile; should the soil show typical gleyed properties, it is classified as wetland. Moving progressively further away from the pan or watercourse and assigning the soil properties, the wetland boundary is determined.
- Matrix colours and mottle of the subsoil at a depth less than 500 mm are then measured against the criteria indicated above and the areas of *Permanently* and *Seasonal waterlogged* conditions mapped;
- Positions of observation points are taken with GPS and placed on a base map, and combined with texture and colour on aerial photographs. The final boundary of the wetland is then delineated.

1.3.7 Air Quality

The Air Quality specialist study will have the following objectives:

- A review of national and international emissions standards and ambient air quality criteria. As a minimum, reference will be made to:
    a) The National Environmental Management Air Quality Act (NEMAQA) (Act. No 39 of 2004)

    b) Inhalation reference concentrations and cancer risk factors published by the United States Environmental Protection Agency (US EPA) and World Health Organisation (WHO).
- A desktop study of the receiving environment, incl.:
    a) The identification of air quality sensitive (AQSRs) receptors from available maps
    b) A study of atmospheric dispersion potential by referring to available weather records, hourly sequential meteorological data for a period of 3 years (required for dispersion modelling), land use and topography data.
    c) Any readily available ambient air quality data.
- The quantification and assessment of air quality impacts including:
    a) The establishment of an atmospheric emissions inventory. Pollutants quantified will include particulate matter (TSP, PM10 and PM2.5), and radon. Published emissions factors from the US EPA and Australian National Pollutant Inventory (NPI) may be used to calculate emissions from the operations.
    b) Atmospheric dispersion modelling to determine ambient air pollutant concentrations and dustfall rates. The US EPA Aermod model will be used. AERMOD is a Gaussian plume steady state model.
    c) The screening of simulated ambient pollutant concentrations against air quality criteria.
- Specialist report including air quality management, mitigation and monitoring plans.

The Radon study will include:
A basic radon study, which requires a radiological impact interpretation to members of the public. The latter includes the following:

- determining the radon exhalation and diffusive parameters;
- assessing the radon inhalation dose from the nearby TSFs; and
- provide guidance on public radiation protection principles.

Methodology:
The assessment of impact as a result of the removal of the gold tailings facilities in close proximity to the proposed development will be undertaken.

The radon study will interpret the radon exhalation rate data and use the radon dispersion simulation output from the Air Quality study to determine the radon inhalation dose. Depending on the availability of full spectrum analysis results for the different TSFs, a radiological impact from all atmospheric pathways can be determined. The proposal makes provision for providing general guidance on public radiation protection principles. The radon exhalation and radon dose assessment results, together with the radiation protection interpretation, will be prepared as a separate report.

1.3.8 Cultural / Historical Heritage

Objectives of the study:
The objectives of the study are to define the heritage component of the Environmental Impact Assessment process. It is described as a first phase Heritage Impact Assessment

(HIA). The report will attempt to evaluate both the accumulated heritage knowledge of the area as well as information derived from direct physical observations.

Methodology:
A Heritage Impact Assessment (including Archaeological, Cultural heritage, Built Heritage and Basic Paleontological Assessment) will be conducted to determine the impacts on heritage resources within the study area.

The following are the required to perform the assessment:

- A desk--top investigation of the area;
- A site visit to the proposed development site;
- Public participation with Interested and Affected Parties (IAP's)
- Identify possible archaeological, cultural, historic, built and paleontological sites within the proposed development area;
- Evaluate the potential impacts of construction and operation of the proposed development on archaeological, cultural, historical resources; built and paleontological resources; and
- Recommend mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural, historical, built and paleontological importance.

The purpose of this study is to determine the possible occurrence of sites with cultural heritage significance within the study area. The study is based on archival and document combined with fieldwork investigations.

1.3.9 Traffic impact study

The purpose of this study is to identify the traffic impact that could be generated by the proposed development on the surrounding road network. The study area, development trip generation, trip distribution, capacity analysis and site access requirements will be assessed and recommendations made in terms of public transport.

1.3.10 Services report and storm water management

The purpose of this study is to determine the impacts associated with the proposed development on the sewer and bulk water system and the required infrastructure needed to service the proposed development. The study will also focus on Storm water releases from the site.

Objectives and Methodology:
The study will look at the extent of the development to determine the sewage flow as well as the water demand associated with this development. Existing bulk water and sewer services, connection points and proposed upgrading will be investigated.

2. IMPACT ASSESSMENT METHODOLOGY

2.1 Introduction

An impact can be defined as any change in the physical-chemical, biological, cultural, and/or socio-economic environmental system that can be attributed to human activities relative to alternatives under study for meeting a project need.

There are numerous assessment methodologies and approaches within the international sphere of assessing the potential impact of development activities on the environment.

When a particular method for environmental impact analysis is selected or used certain general principles must be kept in mind to avoid the mystique and pseudo-science, which cloud many planning procedures. In general terms an environmental assessment evaluation comprises four main tasks:-

- Collection of data;
- Analysis and interpretation of this data;
- Identification of significant environmental impacts;
- Communication of the findings.

Further to the above the proposed mitigation and management options for the identified impacts must be provided. The selected impact evaluation method must enable these four tasks. Impact methodologies provide an organised approach for predicting and assessing these impacts. Any one methodology and approach will have opportunities and constraints, as well as resource and skill demands, and no one method is appropriate for all circumstances. The selected methodologies proposed by this document are appropriate for most situations, taking the above criteria into account.

Impact assessment methodology should comply with the following set of criteria:

a. *Be comprehensive:* The environment consists of intricate systems of biotic and abiotic factors, bound together by complex relationships. The methodology must consider the impact on these factors.
b. *Be flexible:* Flexibility must be contained in the methodology, as projects of different size and scale result in different types of impacts.
c. *Detect true impact:* The actual impact that institutes environmental change, as opposed to natural existing conditional changes. Long-term and short-term changes should be quantified.
d. *Be objective:* The methodology must be objective and unbiased, without interference from external decision-making.
e. *Ensure input of required expertise:* Sound, professional judgement must be assured by a methodology.
f. *Utilize the state of the art:* Draw upon the best available analytical techniques.
g. *Employ explicitly defined criteria:* Evaluation criteria used to assess the magnitude of environmental impacts should not be arbitrarily assigned. The methodology should provide explicitly defined criteria and explicitly stated procedures regarding the use of these criteria, including the documented rational.

h. *Assess actual magnitude of impacts:* A method must be provided for an assessment based on specific levels of impact for each environmental concern.
i. *Provide for overall assessment of total impact:* Aggregation of multiple individual impacts is necessary to provide an evaluation of overall total environmental impacts.
j. *Pinpoint critical impacts:* The methodology must identify and emphasize particularly hazardous impacts.

Methods for identification of environmental impacts can assist in specifying the range of impacts that may occur, including their spatial dimensions and time period. Identification methods answer questions concerning the components of the project and what elements of the environment may be affected by these components.

Function	Methodology
Identification	Description of the existing environmental system Determination of the components of the project Definition of the environment modified by the project
Prediction	Identification of environmental modifications that may be significant Forecasting of the quantity and/or spatial dimensions of change in the identified environment Estimation of the probability that the impact (environmental change) will occur (time period)
Evaluation	Determination of the incidence of costs and benefits to user groups and populations affected by the project Specification and comparison of the trade-offs (costs or effects being balanced) between various alternatives

2.2 Evaluation methods in environmental assessment

Defined as a formal procedure for establishing an order of preference among alternatives. The use of multiple evaluation methods may seem excessively demanding. However, it is usually obtaining the inputs to evaluation methods that are demanding. Once these inputs are available, application of the methods themselves is often relatively straightforward. A particular evaluation obviously should not be seen as equivalent to a decision. Evaluation methods are designed as decision *aids* for decision makers. They do not replace the need for decisions to be made, particularly where issues such as fairness and distribution of costs and benefits are involved. Ultimately evaluation methods should serve as convenient means of connecting assumptions to consequences so that decision-makers can explore and more fully appreciate different alternatives and value sets and ultimately they can make better decisions.

2.3 Formal Procedure

An evaluation method is a formal, explicit, and thorough way of organising and describing choices. The amount and complexity of data characteristic of evaluations of large projects, including small ones, means that the iterative Environmental Assessment process requires a method too comprehensive to be applied casually or intuitively. Methods are intended to be applied repeatedly, each time with deliberate changes in assumptions or data that produce changes in preferences. This evaluation process gradually shows how differences in environmental preferences result in different ratings among alternatives.

Where affected interests conflict, evaluation methods are used to assist in reconciling differences as far as possible and reach compromises.

2.4 Methodology Types

The following lists the most frequently used categories of assessment methodologies. From this schedule those most appropriate and frequently used will be selected for the specific assessment requirements. More than 50 impact analysis methodologies have been developed. Of those considered we have selected the two primary methods and variations on them, being checklists and matrices.

Checklists can be divided into simple, descriptive, scaling, and scaling-weighting checklists. Matrices are subdivided into simple and stepped matrices.

The key point with regard to all environmental impact analysis methodologies is that they are useful tools for examining relative environmental impacts of alternatives. They represent a tool that must be applied with professional judgement, and their results must also be interpreted using professional judgement.

2.5 Implementation methodology used for the impact identification

1. Establish checklists for a.) Environmental characteristics and b.) Human development activities. These lists should be comprehensive and feature all the necessary items on which to base an informed decision.
2. The checklists are further categorised by single assessment sheets for each individual activity impacting on specific environmental parameters.
3. These are evaluated in terms of the following:

2.5.1 Criteria for rating the extent or spatial scale of impacts

Extent Rating	
High	Widespread Far beyond site boundary Regional/national/international scale
Medium	Beyond site boundary Local area
Low	Within site boundary

2.5.2 Criteria for rating the intensity or severity of impacts

Intensity Rating	
High	Disturbance of pristine areas that have important conservation value. Destruction of rare or endangered species.
Medium	Disturbance of areas that have potential conservation value or are of use as resources. Complete change in species occurrence or variety.
Low	Disturbance of degraded areas, which have little conservation value. Minor change in species occurrence or variety.

2.5.3 Criteria for rating the duration of impacts

Duration Rating	
High (Long term)	Permanent. Beyond decommissioning. Long term (More than 15 years).
Medium (Medium term)	Reversible over time. Lifespan of the project. Medium term (5 – 15 years).
Low (Short term)	Quickly reversible. Less than the project lifespan. Short term (0 – 5 years).

2.5.4 Categories for the rating of impact magnitude and significance

Impact Magnitude and Significance Rating	
High	Of the highest order possible within the bounds of impacts that could occur. In the case of adverse impacts, there is no possible mitigation that could offset the impact, or mitigation is difficult, expensive, time-consuming or some combination of these. Social, cultural and economic activities of communities are disrupted to such an extent that these come to a halt. In the case of beneficial impacts, the impact is of a substantial order within the bounds of impacts that could occur.
Medium	Impact is real, but not substantial in relation to other impacts that might take effect within the bounds of those that could occur. In the case of adverse impacts, mitigation is both feasible and fairly easily possible. Social, cultural and economic activities of communities are changed, but can be continued (albeit in a different form). Modification of the project design or alternative action may be required. In the case of beneficial impacts, other means of achieving this benefit are about equal in time, cost and effort.
Low	Impact is of a low order and therefore likely to have little real effect. In the case of adverse impacts, mitigation is either easily achieved or little will be required, or both. Social, cultural and economic activities of communities can continue unchanged. In the case of beneficial impacts, alternative means of achieving this benefit are likely to be easier, cheaper, more effective and less time-consuming.
No impact	Zero impact.

4. Together with the above, integrated in the evaluation checklist sheet provision is made for the:
    - Description of the impact
      Nature, what causes the effect and how is it affected.
    - Intervention specifications
      Design, precautionary, management, rehabilitation and documentation.
    - Items requiring specific argument
      Conceptual limitations, degree of confidence.
    - Higher order impacts
      Cumulative, secondary, synergistic and residual.
    - Monitoring specifications
      What, how, frequency, deviation, detection and reporting.

5. Once the above assessment has been completed an objective evaluation of the potential impact of the activity can be assured. The activity impact is then offset against the list of environmental characteristics in the cause-effect interaction matrix, which will be the evaluated significance.
6. Affected environmental components will be categorised as primary effect and secondary or peripheral effect.

2.6 Conclusion

A combination of the above methodologies will be used during the EIA phase of the project to determine the significance of the potential impacts associated with the proposed development as well as the alternatives investigated.

3. CONSULTING WITH THE COMPETENT AUTHORITY

The competent authority will be consulted during the following steps in the EIA:

- Application: Lodge application and declaration of interest. Applicant receive confirmation of application from GDARD.
- Scoping: Site visit with Authority
  - Public Participation process
  - Submit Scoping Report including Plan of Study for EIA. The authority to consider the Scoping Report / Plan of Study for EIA. The Environmental Assessment Practitioner to receive confirmation of acceptance of Scoping Report and/or the Plan of Study for EIA.
- EIA: Public Participation process and Stakeholder meetings
  - Submit EIA Report and receive confirmation of acceptance and Record of Decision from the Authority.

4. PUBLIC PARTICIPATION PROCESS

4.1 Objectives

The chief objectives of the public participation process are to:

- inform the interested and affected parties (IAPs) of the EIA process;
- provide sufficient background and technical information regarding the proposed development to ensure informed participation;
- create networks and feedback mechanisms whereby IAPs could participate and raise their viewpoints (issues, comments and concerns) with regard to the proposed development; and
- assist in identifying potential environmental (biophysical and social) impacts.

The public participation process would thus ensure that the views of the IAPs would be reflected and considered by the applicant and the authorities.

4.2 Methodology:

The proposed public participation process for the EIA phase of the project will consist of:

4.2.1 Finalisation of Public Participation Report

The Public Participation Report would be completed and finalised after the public meeting and at the end of the public review period. The report will consist of the following:

- background to the proposed project;
- a description of the public participation process followed;
- a list of issues, comments and concerns raised during the public participation process;
- conclusions and recommendations;
- a list of the registered IAP s; and
- minutes of meetings and written comments received during the public participation process.

4.2.2 Making the draft and final EIA report available for public comment

The draft EIA report will be made available to the public for their perusal and comment. All registered IAPs will be notified of the availability of the report. A 30 day review period is recommended for each of the reports. On completion of the review period, the EIA team will update the report in respect of comments received.

The final report will then be presented to the authorities. The final report will also be made available to the public for notification. If there are any further comments, the public will provide these directly to the authorities. This fulfils the requirement that the decision-makers and the public work from the same set of information.

The draft and final report will be made available on the website, faxed or emailed to registered I&APs. Electronic copies will be provided on CD to core stakeholders and otherwise on request.

4.2.3 Notification of Environmental Authorisation

Once an environmental authorisation has been issued by the authorities, the IAPs on the database will be notified of the decision within 12 calendar days. The full environmental authorisation will be made available on request. The public will also be informed of their right to appeal and the process to follow.

5. CONCLUSION

During the Environmental Impact Assessment phase the different design and technology alternatives, but will not be limited to, will be compared in terms of the potential environmental impacts associated with the alternative. Specialist studies will be undertaken during the EIA phase in order to determine the potential impacts on the social and biophysical environment.

All the different preferred alternatives will be used to determine the final layout of the proposed development so that it has the least environmental impact on the environment.

6. REFERENCES

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