



# INFORMATION DECISION SYSTEMS

Geographical Information Systems & Environmental Consulting Services



**DRAFT BASIC ASSESSMENT REPORT: DEVELOPMENT OF THE MASHIMONG PARK,  
WARD 5, CITY OF EKURHULENI**



**GDARD REF: 002/18-09/E0048**

**JULY 2018**



# INFORMATION DECISION SYSTEMS

Geographical Information Systems & Environmental Consulting Services

21<sup>st</sup> September 2018

Gauteng Department of Agriculture and Rural Development (GDARD)  
56 Eloff St,  
Johannesburg,  
2000

Dear Ms Boniswa Berlot

**RE: DRAFT BASIC ASSESSMENT REPORT FOR THE DEVELOPMENT OF THE MASHIMONG PARK IN WARD 5 WITHIN THE CITY OF EKURHULENI.**

The City of Ekurhuleni has embarked on a journey to develop recreational facilities within the city. The proposed project marks one of the developments. The project entails the development of a park in Mashimong, ward 5.

As per Environmental Impact Assessment (EIA) Regulations 2014, as amended in April 2017, the proposed development triggers activities listed on the EIA Regulations 2014. It is for this reason that the applicant has lodged an application for Environmental Authorisation.

A Basic Assessment process has been undertaken to assess the impacts of the development to the environment. The assessment included the biophysical and socio-economic impacts. To advise the Environmental Assessment Practitioner (EAP) and due to the environmental sensitivity of the study area related to the Ecological Support Area and watercourses identified on the site, a Freshwater Impact Assessment and Terrestrial Ecological Scan were conducted (**Appendix G**).

The assessment of impacts depicts low impacts upon successful implementation of the mitigation measures on all phases of the development i.e. pre-construction, construction, operational and decommissioning phase.

Attached herewith is the Draft Basic Assessment report submitted for public review for a period of thirty (30) days i.e. 21<sup>st</sup> September to 21<sup>st</sup> October 2018.

Your comments are highly appreciated and form part of a detailed basic assessment process to further advise the EAP of any additional impacts that are associated with the development.

Should you have any enquiries regarding the contents of this regards, kindly do not hesitate to me.

Yours faithfully,

Graeme Engelbrecht

083 321 0119

IDS - INFORMATION DECISION SYSTEMS

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Directors: Mr G Engelbrecht, Mrs G Lewis, Ms T Balmith



## **Basic Assessment Report in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended, and the Environmental Impact Assessment Regulations, 2014 (Version 1)**

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### Kindly note that:

1. This **Basic Assessment Report** is the standard report required by GDARD in terms of the EIA Regulations, 2014.
2. This application form is current as of 8 December 2014. It is the responsibility of the EAP to ascertain whether subsequent versions of the form have been published or produced by the competent authority.
3. **A draft Basic Assessment Report must be submitted, for purposes of comments within a period of thirty (30) days, to all State Departments administering a law relating to a matter likely to be affected by the activity to be undertaken.**
4. **A draft Basic Assessment Report (1 hard copy and two CD's) must be submitted, for purposes of comments within a period of thirty (30) days, to a Competent Authority empowered in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended to consider and decide on the application.**
5. Five (5) copies (3 hard copies and 2 CDs-PDF) of the final report and attachments must be handed in at offices of the relevant competent authority, as detailed below.
6. The report must be typed within the spaces provided in the form. The size of the spaces provided is not necessarily indicative of the amount of information to be provided. The report is in the form of a table that can extend itself as each space is filled with typing.
7. Selected boxes must be indicated by a cross and, when the form is completed electronically, must also be highlighted.
8. An incomplete report may lead to an application for environmental authorisation being refused.
9. **Any report that does not contain a titled and dated full colour large scale layout plan of the proposed activities including a coherent legend, overlain with the sensitivities found on site may lead to an application for environmental authorisation being refused.**
10. The use of "not applicable" in the report must be done with circumspection because if it is used in respect of material information that is required by the competent authority for assessing the application, it may result in the application for environmental authorisation being refused.
11. No faxed or e-mailed reports will be accepted. Only hand delivered or posted applications will be accepted.
12. Unless protected by law, and clearly indicated as such, all information filled in on this application will become public information on receipt by the competent authority. The applicant/EAP must provide any interested and affected party with the information contained in this application on request, during any stage of the application process.
13. Although pre-application meeting with the Competent Authority is optional, applicants are advised to have these meetings prior to submission of application to seek guidance from the Competent Authority.

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### **DEPARTMENTAL DETAILS**

Gauteng Department of Agriculture and Rural Development  
Attention: Administrative Unit of the of the Environmental Affairs Branch  
P.O. Box 8769  
Johannesburg  
2000

Administrative Unit of the of the Environmental Affairs Branch  
Ground floor Diamond Building  
11 Diagonal Street, Johannesburg

Administrative Unit telephone number: (011) 240 3377  
Department central telephone number: (011) 240 2500

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(For official use only)

<b>NEAS Reference Number:</b>						
<b>File Reference Number:</b>						
<b>Application Number:</b>						
<b>Date Received:</b>						

If this BAR has not been submitted within 90 days of receipt of the application by the competent authority and permission was not requested to submit within 140 days, please indicate the reasons for not submitting within time frame.

N/A

Is a closure plan applicable for this application and has it been included in this report?

if not, state reasons for not including the closure plan.  
N/A

Has a draft report for this application been submitted to a competent authority and all State Departments administering a law relating to a matter likely to be affected as a result of this activity?

Is a list of the State Departments referred to above attached to this report including their full contact details and contact person?

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If no, state reasons for not attaching the list.  
N/A

Have State Departments including the competent authority commented?

If no, why?  
This will occur after the submission of this report – Draft Basic Assessment Report



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# SECTION A: ACTIVITY INFORMATION

## 1. Proposal or Development Description

Project title (must be the same name as per application form):

Development of the Mashimong Park, Ward 5, within the Jurisdiction of the City of Ekurhuleni, Gauteng

The proposed park development consists of the following activities;

• Caretakers house / Guard house	136.29 m <sup>2</sup>
• Ablutions	142.156 m <sup>2</sup>
• Storm water drainage;	4921.89 m <sup>2</sup>
• BMX / Fitness track;	164.17 m
• Agriculture	2284.86 m <sup>2</sup>
• Lighting.	Solar Lights
• Fencing	1250.55 m
• Outdoor furniture	88.87 m <sup>2</sup>
• Amphitheatre	1624.82 m <sup>2</sup>
• Modern Gym and Play equipment	368.71 m <sup>2</sup>
• Botanic Garden	1610.02 m <sup>2</sup>
• Lapa/s	91.2 m <sup>2</sup> (6)
• Braai/ picnic area	2213.29 m <sup>2</sup>

Select the appropriate box

The application is for an upgrade of an existing development	<input type="checkbox"/>	The application is for a new development	<input checked="" type="checkbox"/>	Other, specify	<input type="checkbox"/>
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Does the activity also require any authorisation other than NEMA EIA authorisation?

YES  NO

If yes, describe the legislation and the Competent Authority administering such legislation

Water Use License Application – Department of Water and Sanitation

lol	YES	NO
If yes, have you received approval(s)? (attach in appropriate appendix)	YES	NO

## 2. Applicable legislation, policies and/or guidelines

List all legislation, policies and/or guidelines of any sphere of government that are applicable to the application as contemplated in the EIA regulations:

Title of legislation, policy or guideline:	Administering authority:	Promulgation Date:
Constitution of the Republic of South Africa, 1996 (Act 108 of 1996)		1996
National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998)	Provincial: Gauteng Department of Agriculture, and Rural Development	1998
National Water Act (Act No 36 of 1998)	Provincial: Gauteng Department of Water	1998

Title of legislation, policy or guideline:	Administering authority:	Promulgation Date:
	and Sanitation	

### 3. Alternatives

Describe the proposal and alternatives that are considered in this application. Alternatives should include a consideration of all possible means by which the purpose and need of the proposed activity could be accomplished. The determination of whether the site or activity (including different processes etc.) or both is appropriate needs to be informed by the specific circumstances of the activity and its environment.

The no-go option must in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed. **Do not** include the no go option into the alternative table below.

**Note:** After receipt of this report the competent authority may also request the applicant to assess additional alternatives that could possibly accomplish the purpose and need of the proposed activity if it is clear that realistic alternatives have not been considered to a reasonable extent.

Please describe the process followed to reach (decide on) the list of alternatives below

N/A

Provide a description of the alternatives considered

No.	Alternative type, either alternative: site on property, properties, activity, design, technology, energy, operational or other(provide details of "other")	Description
1	Proposal	Development of the Mashimong Park, Ward 5,
2	Alternative 1	No alternatives have been considered as the site in question has been earmarked as requiring work to be undertaken.
3	Alternative 2	
	Etc.	

In the event that no alternative(s) has/have been provided, a motivation must be included in the table below.

The proposed development does not have alternatives as the proposed development is to upgrade the existing vacant site to create a recreational area for the community.

### 4. Physical size of the activity

Indicate the total physical size (footprint) of the proposal as well as alternatives. Footprints are to include all new infrastructure (roads, services etc), impermeable surfaces and landscaped areas:

	Size of the activity:
Proposed activity <i>(Total environmental (landscaping, parking, etc.) and the building footprint)</i>	13800 m <sup>2</sup>
<b>Alternatives:</b>	
Alternative 1 (if any)	N/A
Alternative 2 (if any)	N/A
	Ha/ m <sup>2</sup>

or, for linear activities:

	Length of the activity:
Proposed activity	N/A
<b>Alternatives:</b>	
Alternative 1 (if any)	N/A

Alternative 2 (if any)		N/A
		m/km

Indicate the size of the site(s) or servitudes (within which the above footprints will occur):

		<b>Size of the site/servitude:</b>
Proposed activity		13800 m <sup>2</sup>
<b>Alternatives:</b>		
Alternative 1 (if any)		N/A
Alternative 2 (if any)		N/A
		Ha/m <sup>2</sup>

## 5. Site Access

### Proposal

Does ready access to the site exist, or is access directly from an existing road?	YES	NO
If NO, what is the distance over which a new access road will be built	m	
Describe the type of access road planned:		
N/A		

Include the position of the access road on the site plan (if the access road is to traverse a sensitive feature the impact thereof must be included in the assessment).

### Alternative 1

Does ready access to the site exist, or is access directly from an existing road?	YES	NO
If NO, what is the distance over which a new access road will be built	m	
Describe the type of access road planned:		
N/A		

Include the position of the access road on the site plan. (if the access road is to traverse a sensitive feature the impact thereof must be included in the assessment).

### Alternative 2

Does ready access to the site exist, or is access directly from an existing road?	YES	NO
If NO, what is the distance over which a new access road will be built	m	
Describe the type of access road planned:		
N/A		

Include the position of the access road on the site plan. (if the access road is to traverse a sensitive feature the impact thereof must be included in the assessment).

## PLEASE NOTE: Points 6 to 8 of Section A must be duplicated where relevant for alternatives

Section A 6-8 has been duplicated	0	Number of times
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(only complete when applicable)

## 6. Layout or Route Plan

A detailed site or route (for linear activities) plan(s) must be prepared for each alternative site or alternative activity. It must be attached to this document. The site or route plans must indicate the following:

- the layout plan is printed in colour and is overlaid with a sensitivity map (if applicable);
- layout plan is of acceptable paper size and scale, e.g.
  - A4 size for activities with development footprint of 10sqm to 5 hectares;
  - A3 size for activities with development footprint of > 5 hectares to 20 hectares;
  - A2 size for activities with development footprint of >20 hectares to 50 hectares);
  - A1 size for activities with development footprint of >50 hectares);
- The following should serve as a guide for scale issues on the layout plan:
  - A0 = 1: 500
  - A1 = 1: 1000
  - A2 = 1: 2000
  - A3 = 1: 4000



- A4 = 1: 8000 (±10 000)
- shapefiles of the activity must be included in the electronic submission on the CD's;
- the property boundaries and Surveyor General numbers of all the properties within 50m of the site;
- the exact position of each element of the activity as well as any other structures on the site;
- the position of services, including electricity supply cables (indicate above or underground), water supply pipelines, boreholes, sewage pipelines, septic tanks, storm water infrastructure;
- servitudes indicating the purpose of the servitude;
- sensitive environmental elements on and within 100m of the site or sites (including the relevant buffers as prescribed by the competent authority) including (but not limited thereto):
  - Rivers and wetlands;
  - the 1:100 and 1:50 year flood line;
  - ridges;
  - cultural and historical features;
  - areas with indigenous vegetation (even if it is degraded or infested with alien species);
- Where a watercourse is located on the site at least one cross section of the water course must be included (to allow the position of the relevant buffer from the bank to be clearly indicated)

**FOR LOCALITY MAP (NOTE THIS IS ALSO INCLUDED IN THE APPLICATION FORM REQUIREMENTS)**

- the scale of locality map must be at least 1:50 000. For linear activities of more than 25 kilometres, a smaller scale e.g. 1:250 000 can be used. The scale must be indicated on the map;
- the locality map and all other maps must be in colour;
- locality map must show property boundaries and numbers within 100m of the site, and for poultry and/or piggery, locality map must show properties within 500m and prevailing or predominant wind direction;
- for gentle slopes the 1m contour intervals must be indicated on the map and whenever the slope of the site exceeds 1:10, the 500mm contours must be indicated on the map;
- areas with indigenous vegetation (even if it is degraded or infested with alien species);
- locality map must show exact position of development site or sites;
- locality map showing and identifying (if possible) public and access roads; and
- the current land use as well as the land use zoning of each of the properties adjoining the site or sites.

## 7. Site photographs

Colour photographs from the center of the site must be taken in at least the eight major compass directions with a description of each photograph. Photographs must be attached under the appropriate Appendix. It should be supplemented with additional photographs of relevant features on the site, where applicable.

## 8. Facility Illustration

A detailed illustration of the activity must be provided at a scale of 1:200 for activities that include structures. The illustrations must be to scale and must represent a realistic image of the planned activity. The illustration must give a representative view of the activity to be attached in the appropriate Appendix.

## SECTION B: DESCRIPTION OF RECEIVING ENVIRONMENT

**Note:** Complete Section B for the proposal and alternative(s) (if necessary)

### Instructions for completion of Section B for linear activities

- 1) For linear activities (pipelines etc) it may be necessary to complete Section B for each section of the site that has a significantly different environment.
- 2) Indicate on a plan(s) the different environments identified
- 3) Complete Section B for each of the above areas identified
- 4) Attach to this form in a chronological order
- 5) Each copy of Section B must clearly indicate the corresponding sections of the route at the top of the next page.

Section B has been duplicated for sections of the route	<b>0</b>	times
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### Instructions for completion of Section B for location/route alternatives

- 1) For each location/route alternative identified the entire Section B needs to be completed
- 2) Each alternative location/route needs to be clearly indicated at the top of the next page
- 3) Attach the above documents in a chronological order

Section B has been duplicated for location/route alternatives	<b>0</b>	times	(complete only when appropriate)
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### Instructions for completion of Section B when both location/route alternatives and linear activities are applicable for the application

Section B is to be completed and attachments order in the following way

- All significantly different environments identified for Alternative 1 is to be completed and attached in a chronological order; then
- All significantly different environments identified for Alternative 2 is to be completed and attached chronological order, etc.

Section B - Section of Route	(complete only when appropriate for above)
------------------------------	--

Section B – Location/route Alternative No.	(complete only when appropriate for above)
--	--

## 1. Property Description

<b>Property description:</b> (Including Physical Address and Farm name, portion etc.)	Erf No: 892 Portion No: 00 Municipality: City of Ekurhuleni TOIR08240000089200000
--	--

## 2. Activity Position

– Where do I put the activity position? It only gives you an option for the alternative

Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in decimal degrees. The degrees should have at least six decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection.

Alternative:	Latitude (S):	Longitude (E):
	N/A	N/A

**In the case of linear activities:**

Alternative:	Latitude (S):	Longitude (E):
• Starting point of the activity	N/A	N/A
• Middle point of the activity	N/A	N/A
• End point of the activity	N/A	N/A

For route alternatives that are longer than 500m, please provide co-ordinates taken every 250 meters along the route and attached in the appropriate Appendix

Addendum of route alternatives attached	N/A
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The 21 digit Surveyor General code of each cadastral land parcel

PROPOSAL	T	0	I	R	0	8	2	4	0	0	0	0	0	8	9	2	0	0	0	0	
ALT. 1																					
ALT. 2																					
etc.																					

### 3. Groundwater, Soil and Geological stability of the site

a) Is the site located on any of the following?

Shallow water table (less than 1.5m deep)		NO
Dolomite, sinkhole or doline areas		NO
Seasonally wet soils (often close to water bodies)	YES	
Unstable rocky slopes or steep slopes with loose soil		NO
Dispersive soils (soils that dissolve in water)		NO
Soils with high clay content (clay fraction more than 40%)		NO
Any other unstable soil or geological feature	YES	
An area sensitive to erosion		NO

(Information in respect of the above will often be available at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by Geological Survey may also be used).

b) are any caves located on the site(s)	YES	NO
If yes to above provide location details in terms of latitude and longitude and indicate location on site or route map(s)		
Latitude (S):	Longitude (E):	
N/A	N/A	

c) are any caves located within a 300m radius of the site(s)	YES	NO
If yes to above provide location details in terms of latitude and longitude and indicate location on site or route map(s)		
Latitude (S):	Longitude (E):	
N/A	N/A	

d) are any sinkholes located within a 300m radius of the site(s)	YES	NO
If yes to above provide location details in terms of latitude and longitude and indicate location on site or route map(s)		
Latitude (S):	Longitude (E):	
N/A	N/A	

If any of the answers to the above are "YES" or "unsure", specialist input may be requested by the Department





## 6. Socio-Economic Context

Describe the existing social and economic characteristics of the area and the community condition as baseline information to assess the potential social, economic and community impacts.

The proposed activity is situated in the township of Tembisa. Tembisa is a township that was established in 1957 by the apartheid government. Its name comes from the Zulu word thembisa which means 'to promise' or 'give hope'. It is said that when black residents were evicted from other areas in Johannesburg to live in what was to be called Tembisa, they saw the area as a place that would give hope, as they were no longer homeless. The proposed development aims at uplifting the socio-economic standard of the Mashimong area, sustain the existing stream and assist the wetland to reinstate its original natural condition.

As a result, this development will not only serve the recreational development factor but will also prevent future environmental impacts on the present sensitive elements on the area without threatening the livelihood of the community.

According to the Statistics SA Census 2011, the total population of Tembisa is 463,109 with 98.9% of black Africans. Of the population group, 53.9% of the population is male with the remaining 46.1% of females. Sepedi is the dominating language with 33.1% of the population and a low 2.1% for English.

A high percentage of 22.2% of the population has no income with only 0.1% of the population with an income greater than R 2 457 601. This is indicative of a population requiring income.

## 7. Cultural/Historical Features

Please be advised that if section 38 of the National Heritage Resources Act 25 of 1999 is applicable to your proposal or alternatives, then you are requested to furnish this Department with written comment from the South African Heritage Resource Agency (SAHRA) – Attach comment in appropriate annexure

38. (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as-

- (a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- (b) the construction of a bridge or similar structure exceeding 50m in length;
- (c) any development or other activity which will change the character of a site-
  - (i) exceeding 5 000 m<sup>2</sup> in extent; or
  - (ii) involving three or more existing erven or subdivisions thereof; or
  - (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
  - (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
- (d) the re-zoning of a site exceeding 10 000 m<sup>2</sup> in extent; or
- (e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

Are there any signs of culturally (aesthetic, social, spiritual, environmental) or historically significant elements, as defined in section 2 of the National Heritage Resources Act, 1999, (Act No. 25 of 1999), including archaeological or palaeontological sites, on or close (within 20m) to the site?	<b>YES</b>	<b>NO</b>
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If YES, explain:
N/A

If uncertain, the Department may request that specialist input be provided to establish whether there is such a feature(s) present on or close to the site.		
Briefly explain the findings of the specialist if one was already appointed:		
N/A		
Will any building or structure older than 60 years be affected in any way?	YES	NO
Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?	YES	NO
If yes, please attached the comments from SAHRA in the appropriate Appendix		

## SECTION C: PUBLIC PARTICIPATION (SECTION 41)

The Environmental Assessment Practitioner must conduct public participation process in accordance with the requirement of the EIA Regulations, 2014.

### 1. Local Authority Participation

Local authorities are key interested and affected parties in each application and no decision on any application will be made before the relevant local authority is provided with the opportunity to give input. The planning and the environmental sections of the local authority must be informed of the application at least thirty (30) calendar days before the submission of the application to the competent authority.

Was the draft report submitted to the local authority for comment?	YES	NO
--	-----	----

If yes, has any comments been received from the local authority?	YES	NO
--	-----	----

If "YES", briefly describe the comment below (also attach any correspondence to and from the local authority to this application):
--

N/A
-----

If "NO" briefly explain why no comments have been received or why the report was not submitted if that is the case.
---

All correspondence and comments from the interested and affected parties will be recorded and reported on the Final Basic Assessment Report. Details of the public participation process is detailed in <b>Appendix E</b> .
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### 2. Consultation with Other Stakeholders

Any stakeholder that has a direct interest in the activity, site or property, such as servitude holders and service providers, should be informed of the application at least **thirty (30) calendar days** before the submission of the application and be provided with the opportunity to comment.

Has any comment been received from stakeholders?	YES	NO
--	-----	----

If "YES", briefly describe the feedback below (also attach copies of any correspondence to and from the stakeholders to this application):
--

N/A
-----

If "NO" briefly explain why no comments have been received
--

All correspondence and comments from the interested and affected parties will be recorded and reported on the Final Basic Assessment Report. Details of the public participation process is detailed in <b>Appendix E</b> .
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### 3. General Public Participation Requirements

The Environmental Assessment Practitioner must ensure that the public participation process is adequate and must determine whether a public meeting or any other additional measure is appropriate or not based on the particular nature of each case. Special attention should be given to the involvement of local community structures such as Ward Committees and ratepayers associations. Please note that public concerns that emerge at a later stage that should have been addressed may cause the competent authority to withdraw any authorisation it may have issued if it becomes apparent that the public participation process was flawed.

The EAP must record all comments and respond to each comment of the public / interested and affected party before the application report is submitted. The comments and responses must be captured in a Comments and Responses Report as prescribed in the regulations and be attached to this application.

## **4. Appendices for Public Participation**

All public participation information is to be attached in the appropriate Appendix. The information in this Appendix is to be ordered as detailed below

Appendix 1 – Proof of site notice

Appendix 2 – Written notices issued as required in terms of the regulations

Appendix 3 – Proof of newspaper advertisements

Appendix 4 – Communications to and from interested and affected parties

Appendix 5 – Minutes of any public and/or stakeholder meetings

Appendix 6 - Comments and Responses Report

Appendix 7 –Comments from I&APs on Basic Assessment (BA) Report

Appendix 8 –Comments from I&APs on amendments to the BA Report

Appendix 9 – Copy of the register of I&APs



# SECTION D: RESOURCE USE AND PROCESS DETAILS

**Note:** Section D is to be completed for the proposal and alternative(s) (if necessary)

## Instructions for completion of Section D for alternatives

- 1) For each alternative under investigation, where such alternatives will have different resource and process details (e.g. technology alternative), the entire Section D needs to be completed
- 4) Each alternative needs to be clearly indicated in the box below
- 5) Attach the above documents in a chronological order

Section D has been duplicated for alternatives	0	times
--	---	-------

(complete only when appropriate)

Section D Alternative No.	0	(complete only when appropriate for above)
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## 1. Waste, effluent, and emission management

### Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase?	YES	NO
If yes, what estimated quantity will be produced per month?	Quantities not known as yet m <sup>3</sup>	
How will the construction solid waste be disposed of (describe)?		
The construction waste will be temporarily stored on site using bins/skips and then disposed of via a waste service provider		

Where will the construction solid waste be disposed of (describe)?		
The construction waste will be disposed of via a waste service provider.		

Will the activity produce solid waste during its operational phase?	YES	NO
If yes, what estimated quantity will be produced per month?	Quantities not known as yet	

How will the solid waste be disposed of (describe)?		
All domestic and construction waste will be temporarily stored on site using bins/skips and then disposed of via the municipal waste stream.		
Has the municipality or relevant service provider confirmed that sufficient air space exists for treating/disposing of the solid waste to be generated by this activity?	YES	NO
Where will the solid waste be disposed if it does not feed into a municipal waste stream (describe)?		
N/A		

**Note:** If the solid waste (construction or operational phases) will not be disposed of in a registered landfill site or be taken up in a municipal waste stream, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Can any part of the solid waste be classified as hazardous in terms of the relevant legislation?	YES	NO
If yes, inform the competent authority and request a change to an application for scoping and EIA.		

Is the activity that is being applied for a solid waste handling or treatment facility?	YES	NO
If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.		

Describe the measures, if any, that will be taken to ensure the optimal reuse or recycling of materials:
--

Bins and skips on site during the operational phase of the activity will promote recycling practices by clearly labelling disposal areas and bins.

**Liquid effluent (other than domestic sewage)**

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system?	YES	NO
If yes, what estimated quantity will be produced per month?	N/Am <sup>3</sup>	
If yes, has the municipality confirmed that sufficient capacity exist for treating / disposing of the liquid effluent to be generated by this activity (ies)?	YES	NO

Will the activity produce any effluent that will be treated and/or disposed of on site?	Yes	NO
If yes, what estimated quantity will be produced per month?	N/Am <sup>3</sup>	
If yes describe the nature of the effluent and how it will be disposed.		
N/A		
Note that if effluent is to be treated or disposed on site the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA		

Will the activity produce effluent that will be treated and/or disposed of at another facility?	YES	NO
If yes, provide the particulars of the facility:		
Facility name:		
Contact person:		
Postal address:		
Postal code:		
Telephone:	Cell:	
E-mail:	Fax:	
Describe the measures that will be taken to ensure the optimal reuse or recycling of waste water, if any:		
N/A		

**Liquid effluent (domestic sewage)**

Will the activity produce domestic effluent that will be disposed of in a municipal sewage system?	YES	NO
If yes, what estimated quantity will be produced per month?	N/Am <sup>3</sup>	
If yes, has the municipality confirmed that sufficient capacity exist for treating / disposing of the domestic effluent to be generated by this activity (ies)?	YES	NO

Will the activity produce any effluent that will be treated and/or disposed of on site?	YES	NO
If yes describe how it will be treated and disposed off.		
N/A		

**Emissions into the atmosphere**

Will the activity release emissions into the atmosphere?	YES	NO
If yes, is it controlled by any legislation of any sphere of government?	YES	NO
If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.		
If no, describe the emissions in terms of type and concentration:		
During construction, typical construction vehicles will be used, emitting minimal diesel fumes and generating dust.		

**2. Water Use**

Indicate the source(s) of water that will be used for the activity

municipal	Directly from water board	groundwater	river, stream, dam or lake	other	the activity will not use water
-----------	---------------------------	-------------	----------------------------	-------	---------------------------------

If water is to be extracted from groundwater, river, stream, dam, lake or any other natural feature, please indicate	
the volume that will be extracted per month:	N/A

If Yes, please attach proof of assurance of water supply, e.g. yield of borehole, in the appropriate Appendix		
Does the activity require a water use permit from the Department of Water Affairs?	YES	NO
If yes, list the permits required		
Water use licence for Section 21 c and l of the National water Act.		
If yes, have you applied for the water use permit(s)?	YES	NO
If yes, have you received approval(s)? (attached in appropriate appendix)	YES	NO

### 3. Power Supply

Please indicate the source of power supply eg. Municipality / Eskom / Renewable energy source

No electricity required during the construction phase of the activity.

If power supply is not available, where will power be sourced from?

N/A

### 4. Energy Efficiency

Describe the design measures, if any, that have been taken to ensure that the activity is energy efficient:

Solar lights to be used during the operational phase of the activity.

Describe how alternative energy sources have been taken into account or been built into the design of the activity, if any:

Solar lights to be used during the operational phase of the activity.

## SECTION E: IMPACT ASSESSMENT

The assessment of impacts must adhere to the minimum requirements in the EIA Regulations, 2014, and should take applicable official guidelines into account. The issues raised by interested and affected parties should also be addressed in the assessment of impacts as well as the impacts of not implementing the activity (Section 24(4)(b)(i)).

### 1. Issues raised by interested and affected parties

Summarise the issues raised by interested and affected parties.

All correspondence and comments from the interested and affected parties will be recorded and reported on the Final Basic Assessment Report. Details of the public participation process is detailed in **Appendix E**.

Summary of response from the practitioner to the issues raised by the interested and affected parties (including the manner in which the public comments are incorporated or why they were not included)  
(A full response must be provided in the Comments and Response Report that must be attached to this report):

All correspondence and comments from the interested and affected parties will be recorded and reported on the Final Basic Assessment Report. Details of the public participation process is detailed in **Appendix E**.

### 2. Impacts that may result from the construction and operational phase

Briefly describe the methodology utilized in the rating of significance of impacts

#### METHODOLOGY IN ASSESSING POTENTIAL IMPACTS

The method used to determine the significance of impacts associated with the development was motivated by the Department of Environmental Affairs Series 5 of Impact Significance. This method is known as the systematic method which follows the criteria that includes;

- extent or spatial scale of the impact;
- intensity or severity of the impact;
- duration of the impact;
- mitigatory potential;
- acceptability;

Describing the impacts in terms of the above criteria provided a consistent and systematic basis for the comparison and application of judgments. Therefore ratings were assigned for each criterion as described on the following section.

#### **Extent Or Spatial Scale Of The Impact**

This criterion involved the assessment of impacts as to whether the impacts are either limited in extent or affect a wide area or group of people. For example, impacts can either be site-specific, local, regional, national or international. A high rating was issued to an impact that is widespread, medium for impacts that within the local area or beyond the boundary of the site and low for site specific impacts.

#### **Intensity Or Severity Of The Impact**

The intensity of the impacts was assessed as to whether the intensity of the impact is high, medium, low or has no impact in terms of its potential for causing negative or positive effects. The study attempted to quantify the magnitude of the impacts. The EAP made use of the specialists input to determine the intensity of the impacts. As result, a high rating was given to impacts that disturb areas of conservation value i.e. endangered species, medium rating for impacts that affect areas of potential conservation value and low for impacts disturbing areas that are degraded.

#### **Duration Of The Impact**

This criterion aims to assess whether the duration of the impact will be short term (0 to 5 years), medium term (5 to 15years), long term (more than 15 years, with the impact ceasing after the operational life of the development) or considered permanent. For long term impacts, a high rating was issued, and a medium rating for impacts that could be reversible over time and low rating for impacts that could be reversible quickly.

#### **Mitigatory Potential**

The mitigatory criterion aims at determining the potential to mitigate the negative impacts and enhance the positive impacts should be determined. This criterion accommodates all impacts including those that do not have mitigation measures. A high rating was given to impacts that have capability of mitigation of



negative effects, medium for impacts that could be mitigated to a degree without providing a guarantee of the prevention of negative impacts and a low rating for impacts that have no mitigation measures.

**Acceptability**

Focus on the criteria and standards that exist for acceptability are either emissions-based or they relate to the receiving environment (e.g. air quality, water quality or noise). Establishing the acceptability of a potential impact is as important as determining its significance. An impact identified as being non-significant by a specialist may be unacceptable to a particular section of the community. Whereas, a significant impact may be acceptable. A high rating was given for impacts that were unacceptable, medium rating for impacts that were manageable and a low rating for impacts that are acceptable.

The resultant assessment of the impacts using the above criterion is described on the table below from high to low.

Rating	Description
<b>High</b>	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.
<b>Medium</b>	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.
<b>Low</b>	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.

Briefly describe and compare the potential impacts (as appropriate), significance rating of impacts, proposed mitigation and significance rating of impacts after mitigation that are likely to occur as a result of the construction phase for the various alternatives of the proposed development. This must include an assessment of the significance of all impacts.

Proposal			
Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:
<b>Waste generation</b>	<b>Medium</b>	Storage areas for material and equipment shall be situated in a position as agreed in consultation with the ECO. These areas shall be secured to prevent unintended damage or pollution to the environment. All hazardous substances shall be stored within a secured storage area, with impervious lining and bunding. Drip trays shall be used where	<b>Low</b>

Proposal			
Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:
		<p>appropriate.</p> <p><b>General Waste</b></p> <ul style="list-style-type: none"> <li>• Solid waste generated must be disposed of at the registered landfill site. Bins and / or skips shall be provided at convenient intervals for disposal of waste along the work areas and in the construction camp.</li> <li>• Recyclable waste shall be separated, reused and recycled at approved facilities. Proof shall be available.</li> <li>• Different waste bins, for different waste streams, shall be provided to ensure correct waste separation.</li> </ul> <p><b>Sewage/ waste water and infrastructure</b></p> <ul style="list-style-type: none"> <li>• Discharge of waste from temporary chemical toilets into the environment shall be strictly prohibited.</li> </ul> <p><b>Hazardous waste</b></p> <ul style="list-style-type: none"> <li>• Hazardous waste is to be disposed at a Permitted Hazardous Waste Landfill Site. The contractor shall provide proof of disposal</li> <li>• Hazardous waste bins shall be clearly marked, stored in a contained area (or have a drip tray) and covered (either stored under a roof or the top of the container shall be covered with a lid).</li> </ul>	
<b>Soil Erosion</b>	<b>Medium</b>	<p>Suitable erosion control measures shall be implemented in areas sensitive to erosion i.e. the edges of the river. These measures could include:</p> <ul style="list-style-type: none"> <li>• The suitable use of sand bags or soil saver;</li> <li>• The prompt rehabilitation of exposed \ areas (with indigenous vegetation for example where appropriate)</li> <li>• The removal of vegetation, only as it becomes necessary for work to proceed (as per specialists reports)</li> <li>• Preventing the unnecessary removal of vegetation especially on</li> </ul>	<b>Low</b>

Proposal			
Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:
		<p>steep and sensitive areas;</p> <ul style="list-style-type: none"> <li>o</li> <li>• Taking necessary precautions in terms of design, construction and earthworks.</li> </ul> <p>Wind screening and storm water control should be undertaken to prevent soil loss from the site. Procedures that are in place to conserve topsoil during the construction phase of the project are to be applied to the set up phase i.e. topsoil is to be conserved while providing access to the site.</p>	
<b>Reduction Of Air Quality</b>	<b>Medium</b>	<p>All exposed surfaces shall be re-vegetated and/or stabilized as soon as is practically possible.</p> <p>No burning of waste, such as plastic bags, cement bags and litter, shall be permitted at the contractor or restoration sites</p> <p>A complaints register shall be provided to report any excessive dust incidents</p> <p>The Contractor must make alternative arrangements (other than fires) for cooking and / or heating requirements. LPG gas cookers may be used provided that all safety regulations are followed.</p>	<b>Low</b>
<b>Social Impacts( Residents)</b>	<b>Medium</b>	<p>Residents living adjacent to the construction site must be notified of the existence of the hazardous storage area.</p> <p>Local communities or local community organizations shall be given preference in supplying services and labor to the construction activities. A roster of “temporary labor” shall be kept indicating “origin” of employee.</p> <p>Temporary structures on site should be located such that they have as little visual impact on local residents as possible. Lighting on site is to be set out to provide maximum security and to enable easier policing of the site, without creating a visual nuisance to local residents or businesses.</p> <p>. Lighting on the construction site should be pointed downwards and away from oncoming traffic and nearby houses.</p>	<b>Low</b>

Proposal			
Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:
Noise Pollution	Medium	<p>Construction activities must be undertaken according to working hours stipulated by the Applicant i.e. during daylight hours only.</p> <p>Construction vehicles and equipment generating excessive noise shall be fitted with appropriate noise abatement measures</p> <p>Construction workers shall be provided with the appropriate PPE i.e. ear plugs.</p> <p>A complaints register shall be provided to record any complaints regarding excessive noise. All complaints received shall be investigated and a response given to the complainant within 14 days.</p>	Low
Water Pollution	High	<p><b>Storm water</b></p> <ul style="list-style-type: none"> <li>To prevent storm water damage, the increase in storm water run-off resulting from construction activities must be estimated and if necessary, the drainage system must be assessed accordingly. A drainage plan must then be submitted to the Applicant for approval by the ECO.</li> <li>Temporary cut off drains and berms may be required to capture storm water and promote infiltration.</li> <li>Storm water must be disposed of without causing soil saturation, erosion, sloughing and without affecting the integrity of the stream.</li> <li>The storm water leaving the site premises must in no way be contaminated by any substance, whether such substance is a solid, liquid, vapor or gas or a combination thereof which is produced, used, stored, dumped or spilled on the premises.</li> </ul> <p><b>Water Quality</b></p> <ul style="list-style-type: none"> <li>Storage areas that contain hazardous substances must be bunded with an approved impermeable liner</li> <li>Spills in bunded areas must be cleaned up, removed</li> </ul>	Low

Proposal			
Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:
		<p>and disposed of safely from the bunded area as soon after detection as possible to minimize pollution risk and reduced bunding capacity</p> <ul style="list-style-type: none"> <li>Mixing / decanting of all chemicals and hazardous substances must take place either on a tray or on an impermeable surface. Waste from these should then be disposed of to a suitable waste site.</li> <li>Every effort should be made to ensure that any chemicals or hazardous substances do not contaminate the soil or ground water on site</li> <li>Site staff shall not be permitted to use the stream for the purposes of bathing, washing of clothing or for any construction or related activities. Municipal water (or another source approved by the Applicant) should instead be used for all activities such as washing of equipment or disposal of any type of waste, dust suppression, concrete mixing, compacting etc.</li> </ul>	

**Alternative 1** (REPEAT THIS TABLE FOR EACH ALTERNATIVE)

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:
N/A	N/A	N/A	N/A

**No Go**

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:
N/A	N/A	N/A	N/A

List any specialist reports that were used to fill in the above tables. Such reports are to be attached in the appropriate Appendix.

SAS IDS Mashimong Park Freshwater Assessment 100718

Describe any gaps in knowledge or assumptions made in the assessment of the environment and the impacts associated with the proposed development.

### 3. Impacts that may result from the decommissioning and closure phase

Briefly describe and compare the potential impacts (as appropriate), significance rating of impacts, proposed mitigation and significance rating of impacts after mitigation that are likely to occur as a result of the decommissioning and closure phase for the various alternatives of the proposed development. This must include an assessment of the significance of all impacts.

Proposal			
Potential impacts:	Significance rating of impacts(positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:
Environmental pollution ( waste material)	Low	All remaining construction infrastructure, building rubble and waste shall be removed from the site as directed by the ECO.  Waste material of any description, including receptacles, scrap, rubble and tyres, shall be removed entirely from the contractor's cam and disposed of at a recognized landfill facility.	Low
River and Wetland (runoff and stream) pollution due to poor management of solid waste.	Medium	Non-biodegradable refuse such as glass bottles, plastic bags, etc. and biodegradable refuse to be stored in suitable containers (skips) and emptied on an as-required basis for disposal at a licensed disposal facility during the construction and clean-up phase. Precautions to be taken by construction contractor to prevent any refuse from spreading on and from the site (carried downstream in the spruit). Construction contractor to ensure that no litter, refuse, waste, rubble and construction waste generated on the premises is placed, dumped or deposited on adjacent or surrounding properties during or after construction of the proposed stabilization structures. Construction contractor to ensure that appropriate waste handling facilities (skips/bins) are provided for onsite and emptied daily (or as required). A monthly clean-up of the stream (removal of litter) should be planned as on-going maintenance to keep the stream clean.	Low
Water pollution due to spillage of	Low	Construction contractor to ensure effective management of	Low

building aggregate (concrete) and other construction-associated		building materials / chemicals	
Noise generation from construction phase	Medium	Noise from construction equipment and workers will be kept to a minimum. Construction to take place only during regular working hours (7:00 – 17:00) and not on weekends to minimize disturbance to the neighboring residential area.	Low
<b>Alternative 1</b>			
<b>Potential impacts:</b>	<b>Significance rating of impacts(positive or negative):</b>	<b>Proposed mitigation:</b>	
N/A	N/A	N/A	
<b>Alternative 2</b>			
<b>Potential impacts:</b>	<b>Significance rating of impacts (positive or negative):</b>	<b>Proposed mitigation:</b>	
N/A	N/A	N/A	

List any specialist reports that were used to fill in the above tables. Such reports are to be attached in the appropriate Appendix.

Where applicable indicate the detailed financial provisions for rehabilitation, closure and ongoing post decommissioning management for the negative environmental impacts.

N/A

#### 4. Cumulative Impacts

Describe potential impacts that, on their own may not be significant, but is significant when added to the impact of other activities or existing impacts in the environment. Substantiate response:

The proposed development aims at reinstating the recreational value of the site as well as its natural resources within the project area and aims at reducing environmental degradation on site and promote socio-economic development.

#### 5. Environmental Impact Statement

Taking the assessment of potential impacts into account, please provide an environmental impact statement that sums up the impact that the proposal and its alternatives may have on the environment after the management and mitigation of impacts have been taken into account with specific reference to types of impact, duration of impacts, likelihood of potential impacts actually occurring and the significance of impacts.

<b>Proposal</b>
The proposed development of the Mashimong Park aims at providing recreational services to the community. The study conducted by the EAP found no compelling environmental issues that would hinder the proposed project. During the execution of the associated activities, no substantial social or environmental disturbances are anticipated, provided that recommendations of the EMPr and specialists reports are adhered to. The environmental consequences associated with any impacts will not be considered significant if appropriately managed during construction and post-construction.
<b>Alternative 1</b>
N/A



<b>Alternative 2</b>
N/A
<b>No-go (compulsory)</b>
If the no-go option is considered there will be no development of the park which will consequently affect the stability of the banks of the identified stream on the proposed site.

## 6. Impact Summary of the Proposal or Preferred Alternative

For proposal:

The activity aims at uplifting the socio-economic standard of the Mashimong area and to sustain the existing stream on site by rehabilitating the banks of the stream.

For alternative:

N/A

Having assessed the significance of impacts of the proposal and alternative(s), please provide an overall summary and reasons for selecting the proposal or preferred alternative.

The proposed activity aims at uplifting the socio-economic standard of the Mashimong area, sustain the existing stream and assist the wetland to reinstate its original natural condition. As a result, this development will not only serve the recreational development factor but will also prevent future environmental impacts on the present sensitive elements on the area without threatening the livelihood of the community.

## 7. Spatial development tools

Indicate the application of any spatial development tool protocols on the proposed development and the outcome thereof.

N/A

## 8. Recommendation of the Practitioner

Is the information contained in this report and the documentation attached hereto sufficient to make a decision in respect of the activity applied for (in the view of the Environmental Assessment Practitioner as bound by professional ethical standards and the code of conduct of EAPASA).	<b>YES</b>	NO

If "NO", indicate the aspects that require further assessment before a decision can be made (list the aspects that require further assessment):

N/A

If "YES", please list any recommended conditions, including mitigation measures that should be considered for inclusion in any authorisation that may be granted by the competent authority in respect of the application:

It is suggested that all recommended measures stipulated are adhered to and implemented prior to the commencement of construction activities. Furthermore, the mitigation of negative impacts on the associated environment relies heavily on the compliance with the EMP.

Refer to EMP for a detailed list of Environmental Impacts and Mitigation Measures.

## 9. The needs and desirability of the proposed development

(as per notice 792 of 2012, or the updated version of this guideline)

The activity aims at uplifting the socio-economic standard of the Mashimong area. Through this need, the Applicant also noted the condition of the existing stream that is severely degraded due to erosion and pollution. As a result part of the development entails at rehabilitating the stream in order to accommodate the proposed development and to ensure the safety of the visitors of the park.

## 10. The period for which the environmental authorisation is required

(CONSIDER WHEN THE ACITIVITY IS EXPECTED TO BE CONCLUDED)

Not known at this stage.

## 11. Environmental Management Programme (EMPr)

(must include post construction monitoring requirements and when these will be concluded.)

If the EAP answers "Yes" to Point 7 above then an EMP is to be attached to this report as an Appendix

EMPr attached

Yes

# SECTION F: APPENDIXES

The following appendixes must be attached as appropriate (this list is inclusive, but not exhaustive):

It is required that if more than one item is enclosed that a table of contents is included in the appendix

Appendix A: Site plan(s) – *(must include a scaled layout plan of the proposed activities overlain on the site sensitivities indicating areas to be avoided including buffers)*

Appendix B: Photographs

Appendix C: Facility illustration(s)

Appendix D: Route position information

Appendix E: Public participation information

Appendix F: Water use license(s) authorisation, SAHRA information, service letters from municipalities, water supply information

Appendix G: Specialist reports

Appendix H: EMPr

Appendix I: Other information

## CHECKLIST

To ensure that all information that the Department needs to be able to process this application, please check that:

- Where requested, supporting documentation has been attached.
- All relevant sections of the form have been completed.

## Appendix A: Site plan(s)





Outer Space



landscape architects

Title  
Mashimong Park

Project  
**PROJECT**

Client  
City of Ekurhuleni Metropolitan Municipality

Author	Revision No. (Info / Correction)
Checked	
Date	
May 2018	
Scale	
1:1000	
Sheet Number	



## Appendix B: Photographs







## **Appendix C: Facility illustration(s)**



# INFORMATION DECISION SYSTEMS

Geographical Information Systems & Environmental Consulting Services

**See Appendix A**

**IDS - INFORMATION DECISION SYSTEMS**

Information Decision Systems (Pty) Ltd 2013/069574/07  
Physical Address: 14 Eglin Road, Sunninghill, 2157  
Postal Address: PO Box 689, Rivonia, 2128  
Website: [www.ids-cc.co.za](http://www.ids-cc.co.za)

Office Tel: +27 (0) 87 353 2576 Fax: + 27 (0) 86 685 7767 Cell: + 27 (0) 83 321 0119 E-mail: [info@ids-cc.co.za](mailto:info@ids-cc.co.za)  
Directors: Mr G Engelbrecht, Mrs G Lewis, Ms T Balmith

## Appendix D: Route position information



# INFORMATION DECISION SYSTEMS

Geographical Information Systems & Environmental Consulting Services

**N/A**

**IDS - INFORMATION DECISION SYSTEMS**

Information Decision Systems (Pty) Ltd 2013/069574/07  
Physical Address: 14 Eglin Road, Sunninghill, 2157  
Postal Address: PO Box 689, Rivonia, 2128  
Website: [www.ids-cc.co.za](http://www.ids-cc.co.za)

Office Tel: +27 (0) 87 353 2576 Fax: + 27 (0) 86 685 7767 Cell: + 27 (0) 83 321 0119 E-mail: [info@ids-cc.co.za](mailto:info@ids-cc.co.za)  
Directors: Mr G Engelbrecht, Mrs G Lewis, Ms T Balmith

## **Appendix E: Public participation information**

## **Appendix 1 – Proof of site notice**





IDS  
 -25°59'54", 28°14'13", 1589,0m, 105°  
 29 Jun 2018 12:44:02



IDS  
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 29 Jun 2018 12:35:03

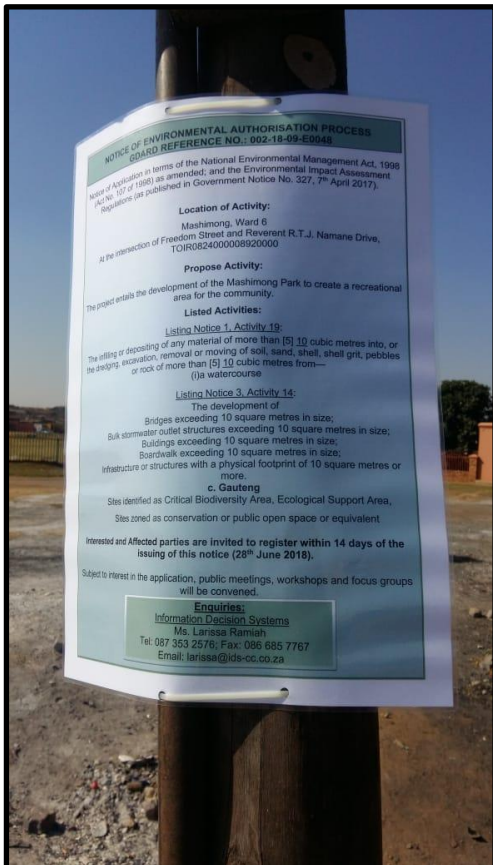


IDS  
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 29 Jun 2018 12:35:13

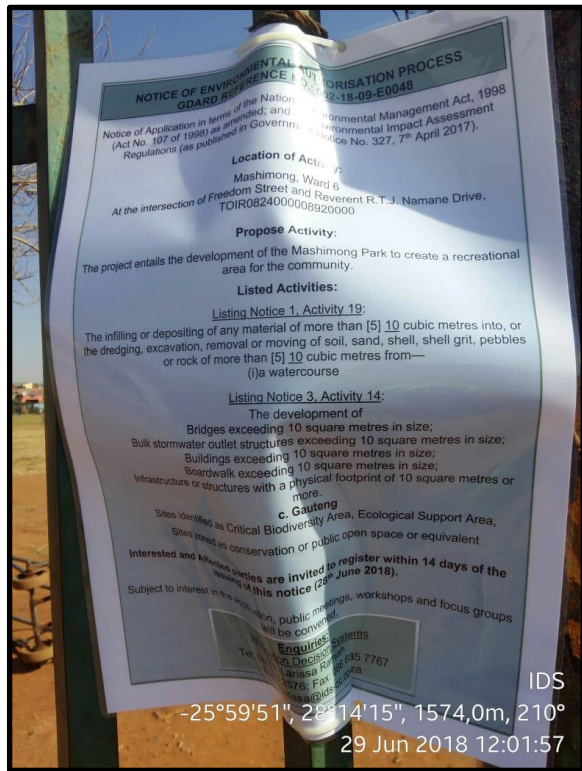


IDS  
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 29 Jun 2018 12:08:20













IDS  
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 29 Jun 2018 12:20:06



IDS  
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 29 Jun 2018 12:20:15



IDS  
 -25°59'42", 28°13'49", 22°  
 29 Jun 2018 12:27:59



IDS  
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 29 Jun 2018 12:28:27

**NOTICE OF ENVIRONMENTAL AUTHORISATION PROCESS  
GDARD REFERENCE NO.: 002-18-09-E0048**

Notice of Application in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended; and the Environmental Impact Assessment Regulations (as published in Government Notice No. 327, 7<sup>th</sup> April 2017).

**Location of Activity:**

Mashimong, Ward 6  
At the intersection of Freedom Street and Reverent R.T.J. Namane Drive,  
TOIR0824000008920000

**Propose Activity:**

The project entails the development of the Mashimong Park to create a recreational area for the community.

**Listed Activities:**

Listing Notice 1, Activity 19:

The infilling or depositing of any material of more than [5] 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shell, shell grit, pebbles or rock of more than [5] 10 cubic metres from—  
(i) a watercourse

Listing Notice 3, Activity 14:

The development of  
Bridges exceeding 10 square metres in size;  
Bulk stormwater outlet structures exceeding 10 square metres in size;  
Buildings exceeding 10 square metres in size;  
Boardwalk exceeding 10 square metres in size;  
Infrastructure or structures with a physical footprint of 10 square metres or more.

**c. Gauteng**

Sites identified as Critical Biodiversity Area, Ecological Support Area,  
Sites zoned as conservation or public open space or equivalent

**Interested and Affected parties are invited to register within 14 days of the issuing of this notice (28<sup>th</sup> June 2018).**

Subject to interest in the application, public meetings, workshops and focus groups will be convened.

**Enquiries:**

Information Decision Systems  
Ms. Larissa Ramiah  
Tel: 087 353 2576; Fax: 086 685 7767  
Email: larissa@ids-cc.co.za

## **Appendix 2 – Written notices issued as required in terms of the regulations**

**BACKGROUND INFORMATION DOCUMENT (BID)  
BASIC ASSESSMENT REPORT FOR THE PROPOSED DEVELOPMENT OF MASHIMONG PARK,  
WARD 5: EKURHULENI  
GDARD REFERENCE: 002/18-09/E0048**

**NOTICE IN TERMS OF APPLICABLE LEGISLATION**

Notice is hereby given in terms of the National Environmental Management Act (NEMA), 1998 (Act 107 of 1998) as amended for the proposed park development in Mashimong, Tembisa, in Ward 6 of the Ekurhuleni Municipality, of which a Basic Assessment will be submitted to the Gauteng Department of Agriculture and Rural Development.

**PURPOSE OF BID**

This **Background Information Document (BID)** in addition to the published notices provides Interested and Affected Parties (I&APs) with background information regarding the proposed project, as well as information regarding the Basic Assessment Report to be undertaken.

It further indicates how you, as a public member can become involved in the project, receive information, or raise issues which may concern and/ or interest you. The Public participation plays an important role in the undertaking of a Basic Assessment Report (BAR), as input from the community contributes to ensuring that all potential issues are considered within the study.

**PROJECT**

Information Decision Systems (Pty) Ltd., on behalf of City of Ekurhuleni, is managing the process of obtaining Environmental Authorisation for the project as per the activities listed below;

- |                                  |                         |
|----------------------------------|-------------------------|
| • Caretakers house / Guard house | 136.29 m <sup>2</sup>   |
| • Ablutions                      | 142.156 m <sup>2</sup>  |
| • Storm water drainage;          | 4921.89 m <sup>2</sup>  |
| • BMX / Fitness track;           | 164.17 m                |
| • Agriculture                    | 2284.86 m <sup>2</sup>  |
| • Lighting.                      | Solar Lights            |
| • Fencing                        | 1250.55 m               |
| • Outdoor furniture              | 88.87 m <sup>2</sup>    |
| • Amphitheatre                   | 1624.82 m <sup>2</sup>  |
| • Modern Gym and Play equipment  | 368.71 m <sup>2</sup>   |
| • Botanic Garden                 | 1610.02 m <sup>2</sup>  |
| • Lapa/s                         | 91.2 m <sup>2</sup> (6) |
| • Braai/ picnic area             | 2213.29 m <sup>2</sup>  |

**APPLICABLE LEGISLATION**

The following listed activities from **Government Notice 327 (7<sup>th</sup> April 2017)** were identified in terms of NEMA (Act No. 107 of 1998) as amended:

GN R. 327	Listing Notice 1 Activity Number Item19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shell, shell grit, pebbles or rock of more than 10 cubic metres from— (i) a watercourse
-----------	---	---

GN R. 324	Listing Notice 3 Activity Number Item 14	The development of Bridges exceeding 10 square metres in size; Bulk stormwater outlet structures exceeding 10 square metres in size; Buildings exceeding 10 square metres in size; Boardwalk exceeding 10 square metres in size; Infrastructure or structures with a physical footprint of 10 square metres or more. <b>c. Gauteng</b> Sites identified as CBA, ESA, Sites zoned as conservation or public open space or equivalent
-----------	--	---

**LOCATION**

The proposed project is located at the intersection of Freedom Street and Reverent R.T.J. Namane Drive, Mashimong, Tembisa, Ward 5, Ekurhuleni.

**PROCESS**

- Notices have been placed in the Provincial Gazette and local newspaper Tembisan (5<sup>th</sup> July 2018).
- Further notification and BID are to be delivered to other identified I&APs including neighbours, authorities and stakeholders.
- A Draft Basic Assessment Report will be submitted to Gauteng Department of Agriculture and Rural Development.
- Incorporate stakeholder comments into Final Basic Assessment Report
- A Final Basic Assessment Report will then be submitted to the Gauteng Department of Agriculture and Rural Development.

**ROLE OF INTERESTED AND AFFECTED PARTIES (I&AP)**

Your involvement is key as part of the public participation process. The public participation process will ensure that your concerns and comments are addressed adequately; Interested and Affected Parties (I&APs) are invited to register their interest in participating in the process. Please complete the attached form or contact the person below should you wish to be registered as an I&AP or make any comments regarding this project.

Please complete and return

<b>TO:</b> Ms. Larissa Ramiah	
<b>COMPANY:</b> Information Decision System (Pty) Ltd	
<b>POSTAL:</b> P. O. Box 689, Rivonia, 2128	
<b>PHONE:</b> 087 353 2576	<b>FAX:</b> 086 685 7767
<b>EMAIL:</b> larissa@ids-cc.co.za	
<b>FROM (Your Name):</b>	
<b>ORGANISATION / COMPANY:</b>	
<b>PHONE:</b>	<b>FAX:</b>
<b>EMAIL:</b>	
<b>Your particular area of interest in the project:</b>	



**Organisation Represent:**

**Capacity (e.g. Chairperson, member, etc.):**

1. Do you have any concerns about the proposed refurbishment (i.e. construction and / or operational phase of the proposed project) that you feel should be addressed within the Basic Assessment process?

\_\_\_\_\_ YES \_\_\_\_\_ NO

If "yes", please list your main areas of concern in point form.

i) \_\_\_\_\_

ii) \_\_\_\_\_

2. What concerns do you have about the construction phase in particular?

\_\_\_\_\_

3. What concerns do you have about the operational phase of the process?

\_\_\_\_\_

4. Is there any other information you feel should be included/considered in the assessment of the project?

\_\_\_\_\_

\_\_\_\_\_

5. Do you have any other comment?

\_\_\_\_\_

\_\_\_\_\_

*Please add more pages if necessary.*

6. Do you want to be kept informed of the process/ provided with documentations produced?

\_\_\_\_\_

\_\_\_\_\_

7. Please provide details of other possible I&AP's.

\_\_\_\_\_

\_\_\_\_\_

**Please complete and return**

# ANNEXURE: LOCALITY MAP





# Legend

- Site Notices
- Roads
- Erven
- ▨ Mashimong Park



**Project Title: Mashimong Park**  
**Map Title: Locality Map**



Projection:  
WGS 1984



## **Appendix 3 – Proof of newspaper advertisements**

# COMMUNITY NOTICES

CAXTON local media

THE Tembisan  
www.tembisan.co.za

MAKE YOUR BOOKING NOW

011 916-5301 011 918-6067  
logang@caxton.co.za

Due to high demand we cannot screen every advertisement and hereby will not be held accountable should the advert lead to a bogus business.  
Please purchase responsibly.

**CLASSIFIED DEPARTMENT FOR:**

- Boksburg Advertiser
- JHB East Express
- Bedford / Edenvale News
- Germiston City News
- Kempton Express
- Benoni City Times
- Brakpan Herald
- Springs Advertiser
- Alberton Record
- Southern Courier
- Comaro Chronicle
- Kathorus Mail
- Tembisan
- African Reporter

THE DEADLINE FOR THIS PUBLICATION IS:

Wednesdays @ 10H00

**PLEASE NOTE:**

We reserve the right to change the above mentioned deadline at any given time

**PAYMENT METHODS:**

Certain adverts will only be accepted on a cash basis before being published, eg: property, lifts, for sale, gardening & cleaning, employment wanted etc.

1st three adverts cash upfront thereafter accounts considered after an approved credit application.

PAYMENT CAN BE MADE AS FOLLOWS:

- At any of our branches
- By Credit card

c) Into: FNB  
BRANCH CODE: 25-50-05  
CTP LIMITED T/A  
CAXTON NEWSPAPERS  
ACCOUNT NUMBER:  
6218-634-8457  
(Always keep your ID/CO registration number ready)

**PLEASE NOTE:**


Proof of payment MUST be faxed to: 011-918-6067 REFERENCE OR TELEPHONE NUMBER MUST APPEAR ON THE DEPOSIT

**CONDITIONS OF ACCEPTANCE:**

- ADVERTISER'S NOTE:**
- Although every effort will be made to meet the clients' wishes, the date of publication, distribution, the form and position of the entries, the name or/ and title and format of the advertisement the number of copies and place of distribution, shall be at the discretion of the publisher.
  - Errors and omissions must be reported within the first week of insertion
  - When querying an advertisement a reference number MUST be quoted.
  - Credit will not be given for typographical errors which do not lessen the effectiveness of the advertisement.
  - Cancellations & alterations must be phoned through before 9am on the day of the deadline prior to publication.
  - The publisher is entitled to withhold any advertisement from publication and to cancel any advertisement order that has been accepted.
  - Space is sold to the advertiser for the purpose of making announcements concerning his own business and may not be used to attack or make insidious comparisons with other advertisers, firms, institutions or persons.

**0031 Deaths**

**MASEKO VILAKAZI KHULEKANI WILLIAM**



Age: 30 years of 23 Motsho Section, Tembisa. Passed away 27 June 2018. He will be buried on Saturday 7 July 2018 at Mooifontein Cemetery at 10:00 after a service held at Home at 07:30.  
Tel: 063 160 6700 Duduzile

**KEKANA REUBEN LEHLOHONOLO**



Age: 36 years of 321 Leboeng Section, Tembisa. Passed away 27 June 2018. He will be buried on Saturday 7 July 2018 at Mooifontein Cemetery at 12:00 after a service at Universal Church (Difateng Sec - Mathole Cinema) at 10h00am.  
Tel: 072 386 3877 (Michael) 060 752 1278 (Sharon)

**0073 PERSONAL**

**ALCOHOLICS ANONYMOUS**

If you want to drink, that is your problem, if you want to stop, that is ours. Call 0861helpAA or 0861 435722.  
—ZH082403

**0200 SERVICES**

**0280 PROFESSIONAL & BUSINESS**

**DIVORCE ATTORNEY**

Fast professional Divorces, including Pension Fund Collections on Divorce matters. No cash required if there is a Pension Fund. Don't delay, Contact us Now!  
**Heine Bezuidenhout Attorneys Inc.**  
Tel: 011 918-9493  
hb@hb-attorneys.co.za  
MC033658

**Contact us to place your classified advert today!**



**011 916 5301**

logang@caxton.co.za

**BRIDGING CASH**  
While waiting for PENSION / PACKAGE / PROPERTY SALE Payout (lumpsum only)  
Kempton Park  
011 394 6937  
081 562 0510  
NCR 327  
—TH112885


**UDINGA Imali na?**  
Ingabe unemoto noma impahla ebalulekile? Shayela u  
011 422 6354  
072 847 0978  
—TH112940

**Index VACANCIES**

- 0805 Business
- 0810 Computers
- 0815 Employment Wanted
- 0820 General
- 0825 Hairdressing & Beauty
- 0828 Legal
- 0830 Management
- 0835 Medical
- 0840 Part Time/Temps
- 0850 Professional
- 0855 Sales & marketing
- 0860 Security
- 0865 Senior Citizens
- 0870 Technical
- 0875 Trade
- 0890 Domestic Employment Wanted
- 0895 Domestic Employment Available

**0820 GENERAL**

**CALL CENTRE / HELP DESK CONSULTANTS NEEDED**



We are currently looking for inbound & outbound call centre agents with/out experience. To work with our Hotels, Airline and Insurance companies in JHB. Pref age 18-35.  
**EARN UP TO R12500 p/m.**  
Whatsapp: 078 365 3515 / 011 025 8929  
—RN114514

**ARE YOU LOOKING FOR A JOB?**

Passed Matric, Grade 10 or 11?

Visit **ISILUMKO Recruitment Centre** every Monday to Friday From 07h00.

Corner Olifantsfontein Road & Koppel Street Gauteng Business Park Clayville.

Tel: 011 316 6640/28  
**OUR SERVICES ARE 100% FREE!!!**  
—ZH082427

**CONTRACT EMPLOYMENT**

**Site supervisor** for domestic construction. Raft knowledge essential. Drivers licence req.

**Office hour only. Call: 061 269 7707**  
—ZH082437

**0825 HAIRDRESSING & BEAUTY**

**NAIL TECHNICIAN, BARBER, & HAIR STYLISTS**

Needed with Salon experience.

Please contact 061 506 9963 or email CV to: dube.nikiwe5@gmail.com  
—RN114434

**ADVERTISE HERE! 011 916 5301**



**HERBAL REVIVAL**



**FINANCIAL SPECIALIST**  
Get money in your account

My Muthi is the answer & 100% Satisfactory

Bring back lost lover in 2 days and make them love you only  
Magic wallet and magic ring & short  
Boys to bring money into your house  
Muthi to have babies  
Remove bad luck  
Manhood enlargement  
Female tightening & Bum enlargement  
Muthi to win Lotto, Casino and job promotions  
Win tenders & Business attraction  
Win Court cases  
Unfinished jobs  
ALL WORK DONE @ R300

**CONTACT BABA PEMBA**  
073 906 6934  
TEMBISA / KEMPTON  
—JL032895

**0950 Legal Notices**

**NOTICE OF ENVIRONMENTAL AUTHORISATION PROCESS**  
GDARD REFERENCE: 002/18-09/E0048

Applications in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended; and the Environmental Impact Assessment Regulations (as published in Government Notice No. 327, 7 April 2017 for the Basic Assessment will be lodged with the Gauteng Department of Agriculture & Rural Development.

**Proposed Activity:**  
The project entails the development of the Mashimong Park to create a recreational area for the community.

**Location of Activity:**  
Mashimong, Ward 6, At the intersection of Freedom Street and Reverent R.T.J. Namane Drive,

**Listed Activities:**  
**Listing Notice 1, Activity 19:**  
The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shell, shell grit, pebbles or rock of more than 10 cubic metres from—  
(i) a watercourse

**Listing Notice 3, Activity 14:**  
The development of  
Bridges exceeding 10 square metres in size;  
Bulk stormwater outlet structures exceeding 10 square metres in size;  
Buildings exceeding 10 square metres in size;  
Boardwalk exceeding 10 square metres in size;  
Infrastructure or structures with a physical footprint of 10 square metres or more.

**C. Gauteng**  
Sites identified as Critical Biodiversity Area, Ecological Support Area,  
Sites zoned as conservation or public open space or equivalent  
Interested and Affected parties are invited to register within 30 days of the issuing of this notice. Subject to interest in the application, public meetings, workshops and focus groups will be convened.

**Representations may be submitted and further information can be obtained from:**  
Information Decision Systems: Ms. Larissa Ramiah  
Contact: Tel: 087 353 2576; Fax: 086 685 7767  
Email: larissa@ids-cc.co.za  
—JL033105

**TO ADVERTISE WITH US CALL: 011 916 5301**




**NEWS**

READ ALL ABOUT IT!!

CAXTON local media



## **Appendix 4 –Communications to and from interested and affected parties**

Reply Reply All Forward



Thu 2018/07/05 08:40 AM

larissa@ids-cc.co.za

Environmental Background Information Document for the proposed development of Mashimong Park, Tembisa

To

Bcc 'Mbulaheni.Makhadi@ekurhuleni.gov.za'; 'Lillian.Kwakwa@ekurhuleni.gov.za'; 'MhingaV@dws.gov.za'; 'Sivelenel@dwa.gov.za'; 'alan@ospace.co.za'; 'thozama@ospace.co.za'; 'Terisa Balmithi'; 'Graeme Engelbrecht'

Message BID\_GDARD REFERENCE 00218\_09E0048.pdf (294 KB)

Dear Interested & Affected Party

Notice is hereby given in terms of the National Environmental Management Act (NEMA), 1998 (Act 107 of 1998) as amended for the proposed park development in Mashimong, Tembisa, in Ward 6 of the Ekurhuleni Municipality, of which a Basic Assessment will be submitted to the Gauteng Department of Agriculture and Rural Development.

For further reference, the Background Information Document (BID) is attached.

Should you require any clarification, please feel free to contact me.

Kind Regards  
Larissa



**INFORMATION DECISION SYSTEMS**  
Geographical Information Systems & Environmental Consulting Services

**Larissa Ramiah**

☎:	087 353 2576
☎:	086 685 7767
☎:	076 739 4931

## **Appendix 5 – Minutes of any public and/or stakeholder meetings**





# INFORMATION DECISION SYSTEMS

Geographical Information Systems & Environmental Consulting Services

NO PUBLIC MEETING WAS HELD AT THE TIME OF THE SUBMISSION OF THE DRAFT BAR.

MINUTES OF MEETINGS WILL BE INCORPORATED INTO THE FINAL BAR SHOULD A MEETING CONVENE WITH IAP'S.

IDS - INFORMATION DECISION SYSTEMS

Information Decision Systems (Pty) Ltd 2013/069574/07  
Physical Address: 20 Saddle Drive, Woodmead Office Park, Woodmead, 2129, Johannesburg, South Africa  
Postal Address: PO Box 689, Rivonia, 2128  
Office Tel: +27 (0) 87 353 2576 Fax: +27 (0) 86 685 7767 Cell: +27 (0) 83 321 0119 E-mail: [info@ids-cc.co.za](mailto:info@ids-cc.co.za)  
Website: [www.ids-cc.co.za](http://www.ids-cc.co.za)

## Appendix 6 - Comments and Responses Report



# INFORMATION DECISION SYSTEMS

Geographical Information Systems & Environmental Consulting Services

NO COMMENTS RECEIVED TO DATE.

ALL COMMENTS RECEIVED DURING THE PUBLIC PARTICIPATION PROCESS WILL BE INCORPORATED INTO THE FINAL BAR.

**IDS - INFORMATION DECISION SYSTEMS**

Information Decision Systems (Pty) Ltd 2013/069574/07  
Physical Address: 20 Saddle Drive, Woodmead Office Park, Woodmead, 2129, Johannesburg, South Africa  
Postal Address: PO Box 689, Rivonia, 2128  
Office Tel: +27 (0) 87 353 2576 Fax: +27 (0) 86 685 7767 Cell: +27 (0) 83 321 0119 E-mail: [info@ids-cc.co.za](mailto:info@ids-cc.co.za)  
Website: [www.ids-cc.co.za](http://www.ids-cc.co.za)

## **Appendix 7 –Comments from I&APs on Basic Assessment (BA) Report**



# INFORMATION DECISION SYSTEMS

Geographical Information Systems & Environmental Consulting Services

NO COMMENTS RECEIVED TO DATE.

ALL COMMENTS RECEIVED DURING THE PUBLIC PARTICIPATION PROCESS WILL BE INCORPORATED INTO THE FINAL BAR.

**IDS - INFORMATION DECISION SYSTEMS**

Information Decision Systems (Pty) Ltd 2013/069574/07  
Physical Address: 20 Saddle Drive, Woodmead Office Park, Woodmead, 2129, Johannesburg, South Africa  
Postal Address: PO Box 689, Rivonia, 2128  
Office Tel: +27 (0) 87 353 2576 Fax: +27 (0) 86 685 7767 Cell: +27 (0) 83 321 0119 E-mail: [info@ids-cc.co.za](mailto:info@ids-cc.co.za)  
Website: [www.ids-cc.co.za](http://www.ids-cc.co.za)

## **Appendix 8 –Comments from I&APs on amendments to the BA Report**



# INFORMATION DECISION SYSTEMS

Geographical Information Systems & Environmental Consulting Services

N/A

IDS - INFORMATION DECISION SYSTEMS

Information Decision Systems (Pty) Ltd 2013/069574/07  
Physical Address: 20 Saddle Drive, Woodmead Office Park, Woodmead, 2129, Johannesburg, South Africa  
Postal Address: PO Box 689, Rivonia, 2128  
Office Tel: +27 (0) 87 353 2576 Fax: +27 (0) 86 685 7767 Cell: +27 (0) 83 321 0119 E-mail: [info@ids-cc.co.za](mailto:info@ids-cc.co.za)  
Website: [www.ids-cc.co.za](http://www.ids-cc.co.za)

## Appendix 9 – Copy of the register of I&APs



**INTRESTED AND AFFECTED PARTIES DATABASE REGISTER**

<b>Organisation</b>	<b>Contact Person</b>	<b>Contact Details</b>		<b>Address</b>
Ekurhuleni Metropolitan Municipality, Ward 5 Councillor	Nkele Sathekge	071 780 8741	<a href="mailto:Nkele.Sathekge@ekurhuleni.gov.za">Nkele.Sathekge@ekurhuleni.gov.za</a>	Ekurhuleni Metropolitan Municipality
Ekurhuleni Metropolitan Municipality	Lilian Kwakwa	011 999 3171	Lillian.Kwakwa@ekurhuleni.gov.za	Municipality Environmental Resource Management and
Department of Water and Sanitation	Vongani Mhinga	N/A	MhingaV@dws.gov.za	185 Francis Baard Street, Pretoria, 0001
Department of Water and Sanitation	Lilian Siwelane	012 392 1411	SiwelaneL@dwa.gov.za.	185 Francis Baard Street, Pretoria, 0001
Outer Space Landscape Architects	Alan Cooper	0832695492	alan@ospace.co.za	2 Karob Plan, Fourways Gardens, 21
Outer Space Landscape Architects	Thozama Mputa	0763918158	thozama@ospace.co.za	3 Karob Plan, Fourways Gardens, 21
Interested & Affected Party	Onkgopotse Morakile		<a href="mailto:morakile.o@gmail.com">morakile.o@gmail.com</a>	
Ekurhuleni Metropolitan Municipality	Mbulaheni Makhadi		<a href="mailto:Mbulaheni.Makhadi@ekurhuleni.gov.za">Mbulaheni.Makhadi@ekurhuleni.gov.za</a>	Ekurhuleni Metropolitan Municipality
Hlwekisha plants	Julius	073 575 1216	<a href="mailto:hlwekishaplants@gmail.com">hlwekishaplants@gmail.com</a>	

**Appendix F: Water use license(s) authorisation, SAHRA information, service letters from municipalities, water supply information**



# INFORMATION DECISION SYSTEMS

Geographical Information Systems & Environmental Consulting Services

**The Water Use Licence Application has not been lodged. A pre-app meeting with the Department of Water and Sanitation was conducted on the 26<sup>th</sup> July 2018.**

**IDS - INFORMATION DECISION SYSTEMS**

Information Decision Systems (Pty) Ltd 2013/069574/07  
Physical Address: 20 Saddle Drive, Woodmead Office Park, Woodmead, 2129, Johannesburg, South Africa  
Postal Address: PO Box 689, Rivonia, 2128  
Office Tel: +27 (0) 87 353 2576 Fax: +27 (0) 86 685 7767 Cell: +27 (0) 83 321 0119 E-mail: [info@ids-cc.co.za](mailto:info@ids-cc.co.za)  
Website: [www.ids-cc.co.za](http://www.ids-cc.co.za)

## **Appendix G: Specialist reports**



**FRESHWATER RESOURCE ASSESSMENT AS PART OF  
THE BASELINE ASSESSMENT FOR THE PROPOSED  
MASHIMONG PARK DEVELOPMENT WITHIN TEMBISA,  
GAUTENG PROVINCE**

**Prepared for**

**Information Decision Systems**

**July 2018**

<b>Prepared by:</b>	<b>Scientific Aquatic Services</b>
<b>Report author:</b>	<b>C. du Preez</b>
<b>Report reviewer:</b>	<b>S. van Staden (Pr. Sci. Nat)</b>
<b>Report reference:</b>	<b>SAS 218018</b>
<b>Date:</b>	<b>July 2018</b>

Scientific Aquatic Services CC  
CC Reg No 2003/078943/23  
Vat Reg. No. 4020235273  
PO Box 751779  
Gardenview  
2047  
Tel: 011 616 7893  
Fax: 086 724 3132  
E-mail: [admin@sasenvgroup.co.za](mailto:admin@sasenvgroup.co.za)



## EXECUTIVE SUMMARY

Based on the findings of the freshwater resource assessment and the results of the risk assessment, it is the opinion of the ecologist that the proposed Mashimong Park development be considered favourably, provided that the recommended mitigation measures in this report are implemented. If implemented, it is expected that the development as a whole would increase the overall ecological functioning of the river located within the study area. As litter was noticed over the entire extent of the study area and within the river, mitigation measures should be implemented to reduce the distribution thereof as part of the Mashimong Park development, and specifically its recycling area.

## MANAGEMENT SUMMARY

Scientific Aquatic Services (SAS) was appointed to conduct a baseline freshwater resource assessment as part of the Basic Assessment (BA) and Authorisation Process for the proposed upgrade of the Mashimong Park (henceforth referred to as the 'study area') within Tembisa, Gauteng Province, by the City of Ekurhuleni Metropolitan Municipality.

The proposed development entails converting of Mashimong Park into a recreational area, which includes:

- Playground and gym area;
- Picnic and braai areas;
- Ornamental garden;
- Event space;
- Caretakers house; and
- Two pedestrian bridge crossings over the watercourse.

The assessment took the following approach:

- A desktop study was conducted, in which possible watercourses were identified for on-site investigation, and relevant national and provincial databases were consulted. The results of the desktop study are contained in Section 3 of this report;
- During the field assessment, a single watercourse was identified to be traversing the study area in a north to south direction. Analysis of historical imagery indicates that this watercourse could have been considered to be a wetland system, however, due to the historical upstream canalisation and impact of the ongoing surrounding urbanisation, this watercourse is now considered to function as a river system and was assessed as such;
- The detailed results of the field assessment are contained in Section 4 of this report. The river is considered significantly modified, having moderately low to intermediate ecological functioning. A summary of the assessment of the river is provided in Table A below:

**Table A: Summary of results of the field assessment of the river**

Watercourse	PES	Ecoservices	EIS	REC
River	D/E (Largely/Seriously modified)	Moderately Low/Intermediate	C (Moderate)	D (Largely modified)

Following the assessment of the portion of the river associated with the study area, a risk assessment was undertaken to ascertain the significance of potential impacts on the receiving environment, should the proposed development proceed. The risk assessment was based on the initial proposed layout as provided by the proponent, which indicates that two pedestrian bridge crossings would be developed over the river, whilst all other activities would be located outside of the delineated portion of the river but within the 32m GDARD setback area. The results of the risk assessment are presented in Section 5 of this report and are summarised in Table B following below, after which the discussion thereof follows.



**Table B: Summary of the results of the DWS Risk Assessment applied to the portion of the river located within the study area**

No.	Phases	Activity	Aspect	Impact	Severity	Consequence	Likelihood	Significance	Risk Rating
1	Construction Phase	Site clearing prior to commencement of construction activities.	Removal of vegetation and associated disturbances to soils.	*Exposure of soils, leading to increased runoff and erosion, and thus increased sedimentation of the river; *Increased sedimentation of the river, leading to smothering of biota and potentially altering surface water quality; and *Decreased ecoservice provision (specifically the recreational value of the river)	1	3	4	12	L
2		Ground-breaking and excavation activities associated with the construction of walkways (outside of the river, within its 32m Setback Area) and pits for the column for the bridge crossings.	*Removal of topsoil; and *Excavation leading to stockpiling of soil; *Disruption of freshwater soils and the embankment of the river.	*Disturbances of soils leading to increased alien vegetation proliferation, and in turn to further altered freshwater habitat; and *Altered runoff patterns and alteration to flow patterns, leading to increased erosion and sedimentation of the river.	2.25	4.25	9	38.25	L
3		Casting of walkways and the supporting columns of the bridge crossings.	*Mixing and casting of concrete; *Placement of bedding material; *Backfilling of pits, where after it will be compacted; and *Miscellaneous activities by construction personnel.	*Erosion of areas surrounding the excavated pits; *Potential sedimentation of the river; *Potential impacts on water quality and contamination of soils within the river; *Potential of backfill material to enter the river, increasing the sediment load within the river; *Potential for over-compaction of soils within the river, disrupting the growth medium of the river vegetation	1.5	3.5	8	28	L
4		Installation of pre-fabricated steel and wooden pedestrian bridge crossings over the river.	*Uncontrolled trampling of vegetation by construction personnel within the river.	*Compaction of river soils, disrupting the growth medium of the river vegetation; *Disruption to the embankment of the river, potentially causing sedimentation of the river.	1	4	9	36	L
5		Resloping of the river embankments.	*Ongoing disturbances to soils; and *Removal of vegetation.	*Increased sedimentation as a result of disturbances; and *Potential loss of indigenous vegetation (if present) and the further proliferation of alien floral species due to disturbances.	1.75	4.75	9	42.75	L
6	Operational Phase	Operation and maintenance of the recreational structures associated with Mashimong Park.	Mowing of lawns and general garden upkeep.	*Possible proliferation of invasive and alien species; *Trampling within the river by the groundsman potentially leading to soil disturbances and negatively impacting on vegetation.	1	4	9	36	L



No.	Phases	Activity	Aspect	Impact	Severity	Consequence	Likelihood	Significance	Risk Rating
7			Maintenance of the walk ways and bridge crossings	*Increased stormwater runoff into the river from the impermeable walk ways.	1	4	9	36	L
8			Repair of walk ways and bridge crossings	*Impacts as per activity 3 and 4 above as applicable depending upon the location of the repair.	1	4	9	36	L
9		Operation of the recycling area within close proximity to the river.	Disposal of litter within the river	*Increased pollution of the river channel, impacting on the surface water quality of the river; and *Litter could degrade the habitat integrity of the river.	2.25	5.25	10	52.5	L

As the proposed development will, for the most part, be located outside of the boundaries of the delineated river boundary (with the exception of the two proposed pedestrian bridges to cross the river), all activities associated with the construction of the proposed development is considered to be of 'Low' risk significance. Nevertheless, impacts associated with the construction of the walkways within close proximity to the river and the pedestrian bridges crossing the river is considered to impact on the river, albeit also only of 'Low' risk significance.

Activities associated with the development of structures requiring the use of concrete (i.e. the walkways, feature wall, event space area), and impacts associated with spillage of concrete and contamination of soils should be limited through the use of mixing trays and impermeable sumps onto which any mixed concrete can be deposited whilst it awaits placing. If concrete has been spilled outside of the demarcated area, it must be promptly removed and taken to a suitably licensed waste disposal site.

It is recommended that the bridge support columns be placed outside of the river boundary and away from its embankments, in order to limit potential sedimentation of the river during the construction activities, but also to limit erosion from occurring along the columns during the operational phase of the development. During the construction phase it should be ensured that sediment/erosion control devices (i.e. silt traps) are installed and maintained to minimise the risk of impact on the river. The pedestrian bridges to be installed should be similar to the pedestrian bridge crossing the river currently. Pre-fabricated bridges should be installed using a small crane to lift the bridge in place, requiring minimal manual labour and trampling within the river.

As part of the development activities, the embankments of the river should be resloped to stabilise the embankments and to limit any further erosion from occurring. If possible, the embankments should be resloped to a maximum of a 1:3 slope and be revegetated with indigenous freshwater vegetation. During these activities, in order to prevent sedimentation of the river, the slopes can temporarily be stabilised using suitable geotextiles. It is also recommended that, in order to increase the overall PES of the river, indigenous freshwater vegetation also be established within the active channel of the river. This will also increase the surface roughness of the channel (thus reducing the velocity of flow and limiting the potential for erosion to occur), but it will also provide habitat for some small faunal species. Short sedge species and obligate wetland grass species should be established rather than large robust reeds species (such as *Typha capensis*), which could impede flow, cause stagnation and the accumulation of debris. A qualified landscape architect and the ECO should be consulted in this regard.

During the maintenance phase, it is important to monitor the presence of alien and invasive vegetation within the river. If these species become established, they should be eradicated as per the recommendations of the ECO. Maintenance of the lawns and ornamental garden should be undertaken regularly in order to ensure that the park is neat and to monitor any areas in which failure of any structures can be noted. If failures have been noted, the appointed ECO should be informed, by which the relevant actions to repair such structures will be initiated.

The locality of the recycling area is within close proximity to the river. This facility and the human traffic through the study area has caused increased volumes of litter within the river and surrounding area,





and it is therefore recommended that the recycling area be relocated. It is acknowledged that this might not be feasible, as it is an established recycling area, but effort should be made to limit the distribution of unsorted/on-site stored litter from entering the river. Mitigation measures in this regard includes fencing off of the recycling area to prevent the spreading of litter into the river, limit the quantity of materials outside of the recycling area and create community awareness to prevent littering and participation to aid in cleaning up of the river and surrounding area. The relevant municipal officer should be engaged in this regard. It is also recommended to install litter traps within the river, which should be emptied weekly as part of the maintenance activities by the municipality.

Based on the findings of the watercourse ecological assessment, several recommended mitigation measures are made to minimise the impact thereof on the freshwater ecology:

- If feasible, construction must be scheduled for the drier winter period in order to minimise the risk of sediment-laden runoff entering the river as a result of the construction activities;
- Should it be necessary to clear any areas of vegetation, these areas, including contractor laydown areas, must remain as small as possible, to reduce the risk of further proliferation of alien vegetation, and to retain a level of protection to the river during construction (e.g. sediment trapping, slowing of stormwater runoff etc.);
- It is highly recommended that an alien vegetation management plan be compiled during the planning phase and implemented concurrently with the commencement of construction;
- All exposed soils must be protected for the duration of the construction phase with a suitable geotextile (e.g. Geojute or hessian sheeting) to prevent erosion and sedimentation of the river. Soils should not be stockpiled within close proximity to the river, but should rather be outside of the 32m GDARD setback area to prevent sedimentation of the river, and stockpiles may not exceed 2m in height; and
- Due to the human traffic in the vicinity of the river, volumes of litter do enter the river. Whilst this risk is difficult to mitigate directly, measures such as the following should be considered:
  - Provision of adequate refuse bins within the study area as well as ensuring that all refuse and litter is disposed of in accordance with good practice and relevant municipal bylaws;
  - Initiate community and educational programmes in order to educate the community of the impacts littering may have on the environment and discourage them from disposing of litter inappropriately; and
  - Community and educational programmes focussing on the importance of freshwater systems, and the vital ecological services (such as purification of water) that are provided by these systems.

It is the opinion of the freshwater ecologist that the proposed development be considered favourably. If the set-out mitigation measures are implemented throughout the construction and maintenance phases of the development, it is expected that the overall ecological functioning of the river within the study area will improve.



## DOCUMENT GUIDE

No.	Requirement	Section in report
a)	Details of -	
(i)	The specialist who prepared the report	Appendix G
(ii)	The expertise of that specialist to compile a specialist report including a curriculum vitae	Appendix G
b)	A declaration that the specialist is independent	Appendix G
c)	An indication of the scope of, and the purpose for which, the report was prepared	Section 1.2
cA)	An indication of the quality and age of base data used for the specialist report	Section 2.1
cB)	A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change	Section 4.1 and 5.1
d)	The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 2.1
e)	A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Appendix C
f)	Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives	Section 4
g)	An identification of any areas to be avoided, including buffers	Section 4.3
h)	A map superimposing the activity including the associated structure and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers	Section 4.3
i)	A description of any assumption made and any uncertainties or gaps in knowledge	Section 1.3
j)	A description the findings and potential implication\ of such findings on the impact of the proposed activity, including identified alternatives on the environment or activities	Section 4, 5, and 6
k)	Any mitigation measures for inclusion in the EMPr	Section 5.1
l)	Any conditions for inclusion in the environmental authorisation	Section 5
m)	Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 5
n)	A reasoned opinion -	
(i)	As to whether the proposed activity, activities or portions thereof should be authorised	Section 6
(iA)	Regarding the acceptability of the proposed activity or activities	Section 6
(ii)	If the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 6
o)	A description of any consultation process that was undertaken during the course of preparing the specialist report	N/A
p)	A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	N/A
q)	Any other information requested by the competent authority	N/A



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## GLOSSARY OF TERMS

<b>Alien vegetation:</b>	Plants that do not occur naturally within the area but have been introduced either intentionally or unintentionally. Vegetation species that originate from outside of the borders of the biome -usually international in origin.
<b>Biodiversity:</b>	The number and variety of living organisms on earth, the millions of plants, animals and micro-organisms, the genes they contain, the evolutionary history and potential they encompass and the ecosystems, ecological processes and landscape of which they are integral parts.
<b>Buffer:</b>	A strip of land surrounding a wetland or riparian area in which activities are controlled or restricted, in order to reduce the impact of adjacent land uses on the wetland or riparian area.
<b>Catchment:</b>	The area where water is collected by the natural landscape, where all rain and run-off water ultimately flows into a river, wetland, lake, and ocean or contributes to the groundwater system.
<b>Delineation (of a wetland):</b>	To determine the boundary of a wetland based on soil, vegetation and/or hydrological indicators.
<b>Ecoregion:</b>	An ecoregion is a "recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region".
<b>Facultative species:</b>	Species usually found in wetlands (76%-99% of occurrences) but occasionally found in non-wetland areas
<b>Fluvial:</b>	Resulting from water movement.
<b>Gleying:</b>	A soil process resulting from prolonged soil saturation which is manifested by the presence of neutral grey, bluish or greenish colours in the soil matrix.
<b>Groundwater:</b>	Subsurface water in the saturated zone below the water table.
<b>Hydromorphic soil:</b>	A soil that in its undrained condition is saturated or flooded long enough to develop anaerobic conditions favouring the growth and regeneration of hydrophytic vegetation (vegetation adapted to living in anaerobic soils).
<b>Hydrology:</b>	The study of the occurrence, distribution and movement of water over, on and under the land surface.
<b>Hydrophyte:</b>	Any plant that grows in water or on a substratum that is at least periodically deficient of oxygen as a result of soil saturation or flooding; plants typically found in wet habitats.
<b>Intermittent flow:</b>	Flows only for short periods.
<b>Indigenous vegetation:</b>	Vegetation occurring naturally within a defined area.
<b>Mottles:</b>	Soils with variegated colour patterns are described as being mottled, with the "background colour" referred to as the matrix and the spots or blotches of colour referred to as mottles.
<b>Obligate species:</b>	Species almost always found in wetlands (>99% of occurrences).
<b>Perched water table:</b>	The upper limit of a zone of saturation that is perched on an unsaturated zone by an impermeable layer, hence separating it from the main body of groundwater
<b>Perennial:</b>	Flows all year round.
<b>RAMSAR:</b>	The Ramsar Convention (The Convention on Wetlands of International Importance, especially as Waterfowl Habitat) is an international treaty for the conservation and sustainable utilisation of wetlands, i.e., to stem the progressive encroachment on and loss of wetlands now and in the future, recognising the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value. It is named after the city of Ramsar in Iran, where the Convention was signed in 1971.
<b>RDL (Red Data listed) species:</b>	Organisms that fall into the Extinct in the Wild (EW), critically endangered (CR), Endangered (EN), Vulnerable (VU) categories of ecological status
<b>Seasonal zone of wetness:</b>	The zone of a wetland that lies between the Temporary and Permanent zones and is characterised by saturation from three to ten months of the year, within 50cm of the surface
<b>Temporary zone of wetness:</b>	the outer zone of a wetland characterised by saturation within 50cm of the surface for less than three months of the year
<b>Watercourse:</b>	In terms of the definition contained within the National Water Act, a watercourse means: <ul style="list-style-type: none"> <li>• A river or spring;</li> <li>• A natural channel which water flows regularly or intermittently;</li> <li>• A wetland, dam or lake into which, or from which, water flows; and</li> <li>• Any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse;</li> <li>• and a reference to a watercourse includes, where relevant, its bed and banks</li> </ul>
<b>Wetland Vegetation (WetVeg) type:</b>	Broad groupings of wetland vegetation, reflecting differences in regional context, such as geology, climate, and soils, which may in turn have an influence on the ecological characteristics and functioning of wetlands.



## ACRONYMS

°C	Degrees Celsius.
BAR	Basic Assessment Report
BGIS	Biodiversity Geographic Information Systems
CBA	Critical Biodiversity Area
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EC	Ecological Class or Electrical Conductivity (use to be defined in relevant sections)
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EMP	Environmental Management Program
ESA	Ecological Support Area
FEPA	Freshwater Ecosystem Priority Areas
GIS	Geographic Information System
GN	General Notice
GPS	Global Positioning System
HGM	Hydrogeomorphic
m	Meter
MAP	Mean Annual Precipitation
NEMA	National Environmental Management Act
NFEPA	National Freshwater Ecosystem Priority Areas
NWA	National Water Act
NWCS	National Wetland Classification System
PEMC	Present Ecological Management Class
PES	Present Ecological State
REC	Recommended Ecological Category
RQIS	Research Quality Information Services
SACNASP	South African Council for Natural Scientific Professions
SANBI	South African National Biodiversity Institute
SANParks	South African National Parks
SAS	Scientific Aquatic Services
subWMA	Sub-Water Management Area
WetVeg Groups	Wetland Vegetation Groups
WMA	Water Management Areas
WRC	Water Research Commission
WULA	Water Use License Application



# 1 INTRODUCTION

## 1.1 Background

Scientific Aquatic Services (SAS) was appointed to conduct a baseline freshwater resource assessment as part of the Basic Assessment (BA) and Authorisation Process for the proposed upgrade of the Mashimong Park (henceforth referred to as the 'study area') within Tembisa, Gauteng Province, by the City of Ekurhuleni Metropolitan Municipality.

Mashimong Park is situated within the suburb of Mashimong and is bordered by the suburb of Moring to the east, Sedibeng to the south and Makulong to the north. The western boundary of the study area is bordered by Lapetus Street, Polaris Crescent, and Mimas Street, while Freedom Street and Reverent R.T.J. Namane Drive borders the park to the east and north respectively. Furthermore, the R21 is situated approximately 1 km to the east. The locality of the study area is depicted in Figure 1 and 2.

The proposed development entails converting of Mashimong Park into a recreational area, which includes (Figure 3):

- Playground and gym area;
- Picnic and braai areas;
- Ornamental garden;
- Event space;
- Caretakers house; and
- Two small pedestrian bridge crossings over the watercourse.

In order to identify all potential watercourses that may potentially be impacted by the proposed development, a 500m "zone of investigation" around the study area, in accordance with Regulation 509 of 2016 as it relates to the National Water Act (NWA), was used as a guide in which to assess possible sensitivities of the receiving environment. This area – i.e. the 500m zone of investigation around the study area - will henceforth be referred to as the "investigation area".

The purpose of this report is to define the ecology of the area in terms of watercourse characteristics, including mapping of the watercourses, defining areas of increased Ecological Importance and Sensitivity (EIS), and to define the Present Ecological State (PES) of the watercourses associated with the proposed development. Additionally, this report aims to define the socio-cultural and ecological service provision of the watercourses and the Recommended Ecological Category (REC) for the watercourses. This study further aims to





provide detailed information to guide the proposed project activities in the vicinity of the watercourses, to ensure the ongoing functioning of the ecosystems, such that local and regional conservation requirements and the provision of ecological services in the local area are supported, while considering the need for sustainable economic development.

The Department of Water and Sanitation (DWS) Risk Assessment Matrix was applied to determine the significance of the perceived impacts associated with the proposed development, and the operational impacts on the receiving environment. In addition, mitigatory measures were developed which aim to minimise the perceived impacts associated with the proposed development, followed by an assessment of the significance of the impacts after mitigation, if they are fully implemented.

This report, after consideration and a description of the ecological integrity of the proposed development, must guide the relevant authorities, by means of a reasoned opinion and recommendations, as to the viability of the proposed development activities from a watercourse management point of view.



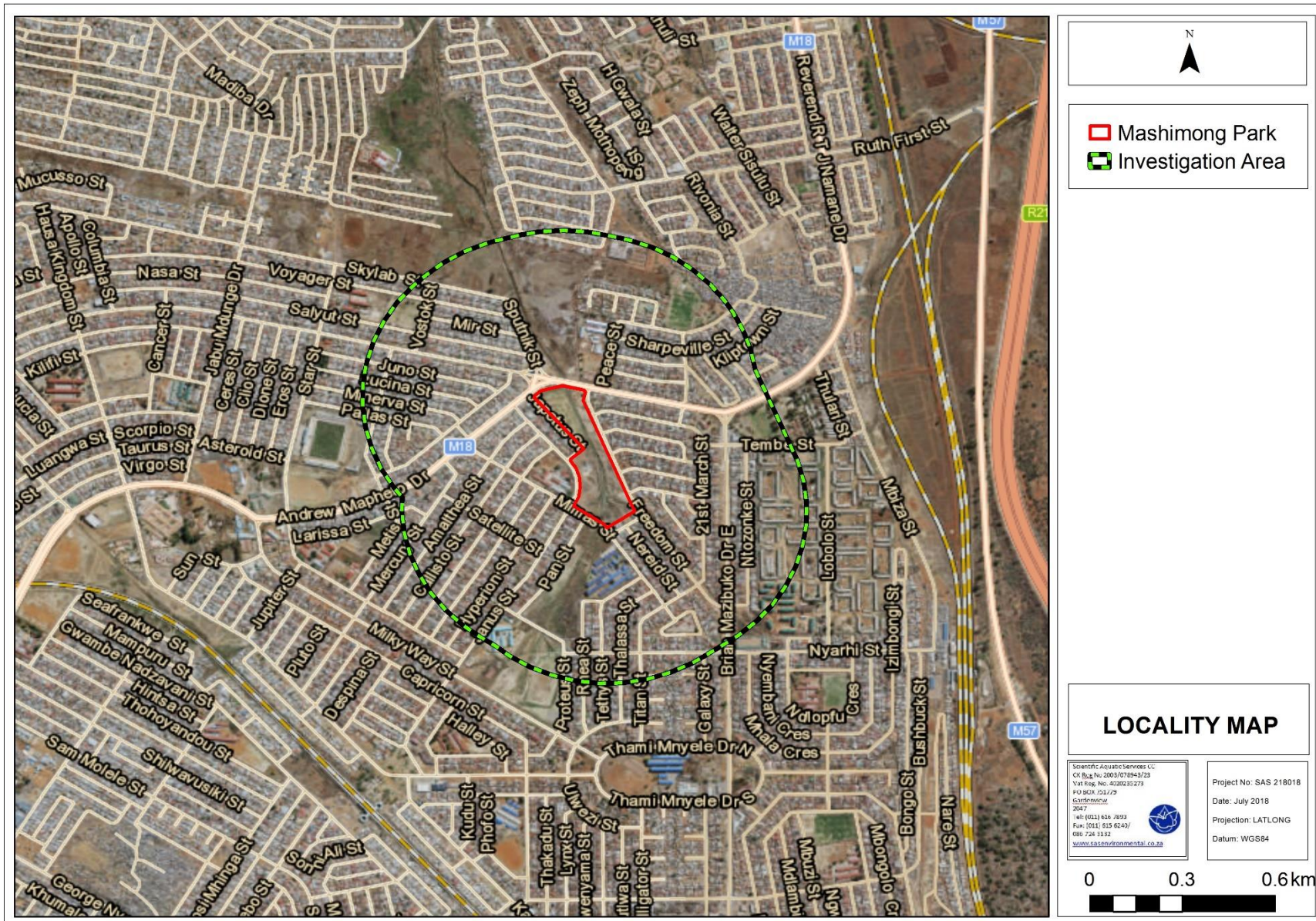


Figure 1: A digital satellite image depicting the location of the study area and investigation area in relation to the surrounding area.





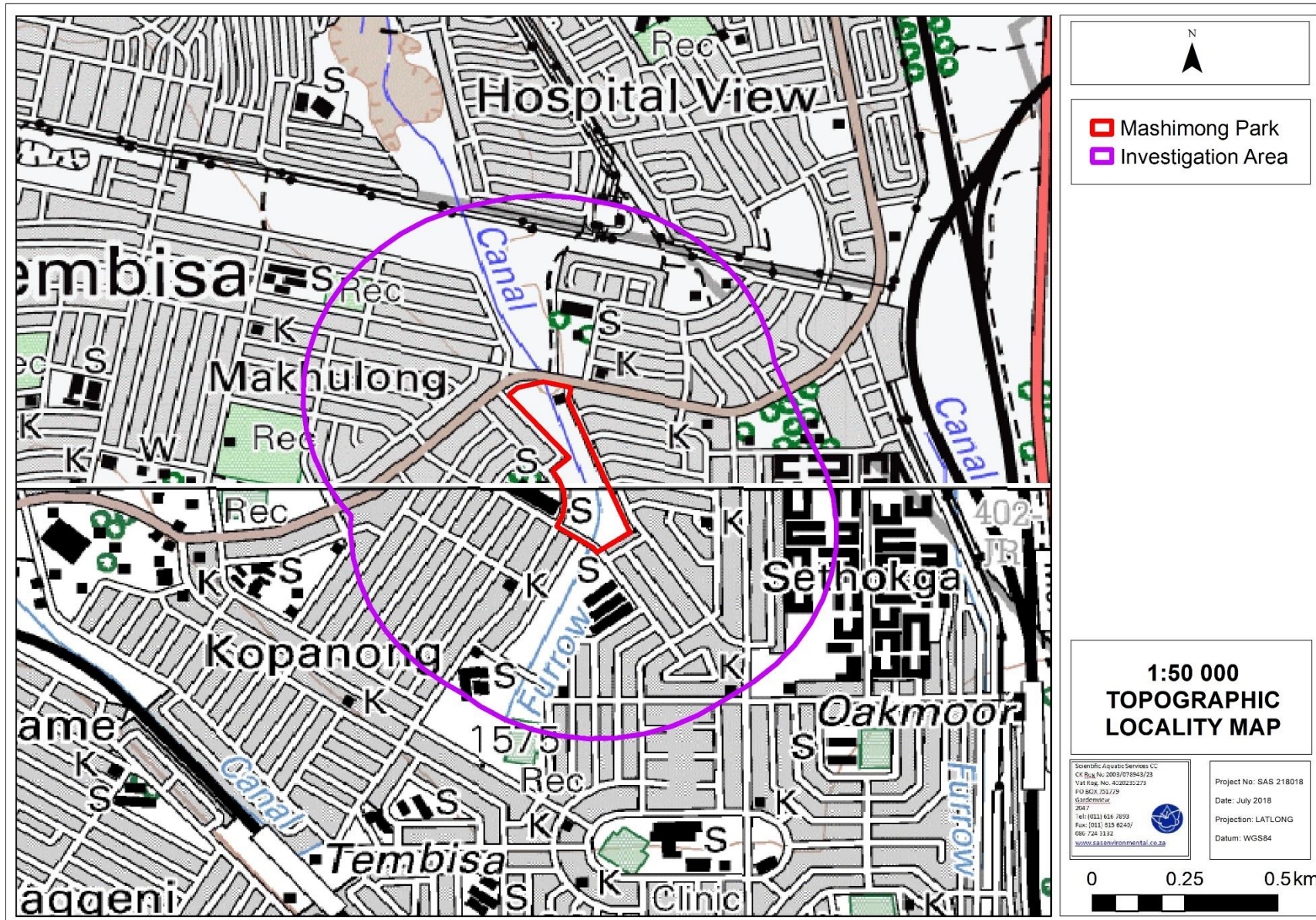


Figure 2: The study area and investigation area depicted on a 1:50 000 topographical map in relation to the surrounding area.







Figure 3: Proposed activities associated with the formalisation of the recreational area of Mashimong Park (Outer Space Landscape Architects, 2018).





## 1.2 Scope of Work

Specific outcomes in terms of this report are outlined below:

- A background study of relevant national, provincial and municipal datasets (such as the National Freshwater Ecosystem Priority Areas [NFEPA] 2011 database; the Department of Water and Sanitation Research Quality Information Services [DWS RQIS PES/EIS], 2014 database and the Gauteng Department of Agriculture and Rural Development [GDARD] Gauteng Conservation Plan, 2011 database) was undertaken to aid in defining the PES and EIS of the watercourses;
- The watercourse was delineated according to “DWAF<sup>1</sup>2005<sup>2</sup>: A practical field procedure for identification of wetlands and riparian areas”. Aspects such as soil morphological characteristics, vegetation types and wetness were used to delineate the watercourse;
- All watercourses within the investigation area were delineated on a desktop basis in accordance with Notice 509 of 2016 as it relates to Section 39 of the National Water Act, 1998 (Act No. 36 of 1998) (NWA);
- The wetland classification assessment was undertaken according to the Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland systems (Ollis *et al.*, 2013);
- The EIS of the watercourse were determined according to the method described by Rountree & Kotze (2013);
- The PES of the watercourse was determined according to the resource-directed measures guideline of Macfarlane *et al.* (2008);
- The watercourse was mapped according to the ecological sensitivity of the watercourse in relation to the proposed development. In addition to the watercourse boundaries, the appropriate provincial recommended buffers and legislated zones of regulation were depicted where applicable;
- Allocation of a suitable REC (Recommended Ecological Category) to the watercourse based on the results obtained from the PES and EIS assessments;
- The DWS Risk Assessment Matrix was applied to identify potential impacts that may affect the watercourse as a result of the proposed development, and to aim to quantify the significance thereof; and

---

<sup>1</sup> The Department of Water Affairs and Forestry (DWAF) was formerly known as the Department of Water Affairs (DWA). At present, the Department is known as the Department of Water and Sanitation (DWS). For the purposes of referencing in this report, the name under which the Department was known during the time of publication of reference material, will be used.

<sup>2</sup> Even though an updated manual has been available since 2008 (Updated Manual for the Identification and Delineation of Wetlands and Riparian Areas), this is still considered a draft document currently under review.



- To present management and mitigation measures which should be implemented during the various development phases to assist in minimising the impact on the receiving environment.

### **1.3 Assumptions and Limitations**

The following assumptions and limitations are applicable to this report:

- As the purpose of this study is to assess the PES, ecological functionality and ecological integrity of the watercourse within the study area, assumptions of habitat that were present before disturbances occurred, were drawn from remaining less impacted habitat. However, the remaining vegetation has been significantly altered in some areas and does not provide good reference site conditions to compare current conditions to. It was therefore necessary for the specialist to use their professional judgement and comparison to more intact systems known in the region for reference purposes;
- A large extent of the naturally occurring vegetation has been removed as part of the landscaping of the existing play park area (within the northern portion of the study area), whilst the vegetation within the southern portion of the study area has been completely disturbed by the disposal of building materials and household refuse. Therefore, the use of vegetation species in aid of the delineation of the watercourse proved to be limited in most areas. Additionally, due to the season in which the field assessment was undertaken (July 2018), almost all of the vegetation present was in a dormancy period, with no inflorescences or flowers to aid with the identification of such species;
- The determination of the watercourse boundaries and the assessment thereof, is confined to the watercourse within the study area. All watercourses identified within 500m of the study area were delineated in fulfilment of Regulation GN509 of the NWA on a desktop level, however these resources were not assessed individually. The general surroundings were considered in the desktop assessment of the study area;
- The watercourse delineation as presented in this report is regarded as a best estimate of the riparian zone boundaries, based on the site conditions present at the time of assessment. Global Positioning System (GPS) technology is inherently inaccurate and some inaccuracies due to the use of handheld GPS instrumentation may occur. If more accurate assessments are required, the watercourse will need to be surveyed and pegged according to surveying principles;
- Freshwater and terrestrial zones create transitional areas where an ecotone is formed as vegetation species change from terrestrial to obligate/facultative species. Within



this transition zone, some variation of opinion on the watercourse boundary may occur. However, if the DWAF (2008) method is followed, all assessors should get largely similar results; and

- With ecology being dynamic and complex, certain aspects (some of which may be important) may have been overlooked. However, it is expected that the proposed development activities have been accurately assessed and considered, based on the field observations and monitoring data in terms of watercourse ecology.

## **1.4 Legislative Requirements and Provincial Guidelines**

The following legislative requirements and relevant provincial guidelines were taken into consideration during the assessment. A detailed description of these legislative requirements is presented in Appendix B:

- The National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA);
- The National Water Act, 1998 (Act 36 of 1998) (NWA);
- General Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the NWA (Act 36 of 1998);
- The Gauteng Department of Agriculture and Rural Development's (GDARD) Requirements for Biodiversity Assessments, Version 3 (GDARD, 2014); and
- National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) (NEMBA).

## **2 ASSESSMENT APPROACH**

### **2.1 Freshwater Resource Field Verification**

For the purposes of this investigation, the definition of a watercourse was taken as per that in the National Water Act (1998). The definition are as follows:

A **watercourse** means:

- (a) a river or spring;
  - (b) a natural channel in which water flows regularly or intermittently;
  - (c) a wetland, lake or dam into which, or from which, water flows; and
  - (d) any collection of water which the Minister may, by notice in the *Gazette*, declare to be a watercourse,
- and a reference to a watercourse includes, where relevant, its bed and banks.

Due to the significant impact of the surrounding anthropogenic activities on the watercourse within the study area, historically this system could have been considered to be a wetland



system, however, due to the historical upstream canalisation and impact of the ongoing surrounding urbanisation, this watercourse is now considered to function as a river system (This would be elaborated upon in Section 4). The definition of a riparian habitat was taken as per that in the National Water Act (1998) and are as follows:

**Riparian habitat** includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterized by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure **distinct** from those of adjacent areas.

The watercourse delineation took place according to the method presented in “A practical field procedure for identification and delineation of wetlands and riparian areas” (DAAF, 2005) as far as practically feasible, given the condition of the study area at the time of assessment. The foundation of the method is based on the fact that watercourses have several distinguishing factors including the following:

- Landscape position;
- The presence of water at or near the ground surface;
- Distinctive hydromorphic soils;
- Vegetation adapted to saturated soils; and
- The presence of alluvial soils in stream systems.

In addition to the delineation process, a detailed assessment of the delineated watercourse was undertaken (in July 2018), whereby factors affecting the integrity of the watercourses were taken into consideration and aided in the determination of the functioning as well as the provision of ecological and socio-cultural services by the watercourses.

A detailed explanation of the method of assessment related to the watercourse assessment is provided in Appendix C of this report.

## **2.2 Sensitivity Mapping**

The watercourse associated with the proposed development was delineated with the use of a Global Positioning System (GPS). Geographic Information System (GIS) was used to project the feature onto digital satellite imagery and topographic maps. The sensitivity map presented in Section 4.3 should guide the design and layout of the development.





### **2.3 Risk Assessment and Recommendations**

Following the completion of the assessment, a risk assessment was conducted (please refer to Appendix D for the method of approach) and recommendations were developed to address and mitigate impacts associated with the proposed development. These recommendations also include general 'best practice' management measures, which apply to the proposed development as a whole, and which are presented in Appendix F. Mitigation measures have been developed to address issues in all phases throughout the life of the operation including planning, construction and operation. The detailed site-specific mitigation measures are outlined in Section 5 of this report.



### **3 RESULTS OF THE DESKTOP ANALYSIS**

#### ***3.1 Analyses of Relevant Databases***

The following section contains data accessed as part of the desktop assessment and are presented as a “dashboard style” report below (Table 1). The dashboard report aims to present concise summaries of the data on as few pages as possible to allow for integration of results by the reader to take place.

It is important to note that although all data sources used provide useful and often verifiable, high quality data, the various databases used do not always provide an entirely accurate indication of the proposed developments’ actual site characteristics at the scale required to inform the environmental authorisation and/or water use licencing processes. However, this information is considered to be useful as background information to the study. Thus, this data was used as a guideline to inform the assessment and to focus on areas and aspects of increased conservation importance during the site-specific field verification survey.



**Table 1: Desktop data relating to the character of watercourses associated with the proposed development and surrounding region.**

Aquatic ecoregion and sub-regions in which Mashimong Park is located		Detail of Mashimong Park in terms of the National Freshwater Ecosystem Priority Area (NFEPA) (2011) database	
Ecoregion	Highveld	River FEPA	Mashimong Park is located within a subWMA considered to be Phase2FEPA. FEPACODE = 3. These are sub-quatarnaries identified as the most efficient set for rehabilitation to an A or B condition to meet under achieved river type targets. The condition of these phase2FEPAs should not be degraded further, as they may in future be considered for rehabilitation.
Catchment	Limpopo		
Quaternary Catchment	A21B		
WMA	Crocodile (West) & Marico		
subWMA	Upper Crocodile	NFEPA Wetlands and Rivers	According to the NFEPA database there are no wetlands or rivers associated with Mashimong Park, nor within the 500m investigation area.
<b>Dominant characteristics of the Highveld Ecoregion Level 2 (11.01) (Kleynhans <i>et al.</i>, 2007)</b>			
Dominant primary terrain morphology	Plains; Low Relief	Wetland Vegetation Type	Mashimong Park falls within the Dry Highveld Grassland Group 5 wetland vegetation type, which is considered to be Least Threatened.
Dominant primary vegetation types	Rocky Highveld Grassland, Mixed Bushveld	<b>Detail of Mashimong Park in terms of the Gauteng Conservation Plan (C-Plan V3.3, 2011) (Figure 4)</b>	
Altitude (m a.m.s.l)	1300-1900	River and Wetland Buffer	The Gauteng C-Plan indicate a non-perennial river buffer traversing Mashimong Park and the investigation area. A Wetland Buffer is situated approximately 400m north of Mashimong Park within the investigation area,
MAP (mm)	500 to 700		
Coefficient of Variation (% of MAP)	20 to 34	Critical Biodiversity Area (CBA)	There are no CBAs associated with Mashimong Park, however a CBA considered important for "Red" and "Orange" listed plant habitat, and for primary vegetation is situated approximately 25m to the north. A CBA is an area considered important for the survival of threatened species and includes valuable ecosystems such as wetlands, untransformed vegetation and ridges.
Rainfall concentration index	55 to 64		
Rainfall seasonality	Early to mid-summer		
Mean annual temp. (°C)	14 to 18		
Winter temperature (July)	0 – 20 °C		
Summer temperature (Feb)	12 – 30 °C	Ecological Support Area (ESA)	An ESA overlapping with the non-perennial river buffer traverses Mashimong Park. ESAs are defined by GDARD as natural, near-natural, degraded or heavily modified areas required to be maintained in an ecologically functional state to support CBAs and/or Protected Areas.
Median annual simulated runoff (mm)	20 to 60		

**CBA = Critical Biodiversity Areas; DWS = Department of Water and Sanitation; EI = Ecological Importance; ES = Ecological Sensitivity; ESA = Ecological Support Area; m.a.m.s.l = Meters Above Mean Sea Level; MAP = Mean Annual Precipitation; NFEPA = National Freshwater Ecosystem Priority Areas; WMA = Water Management Area**



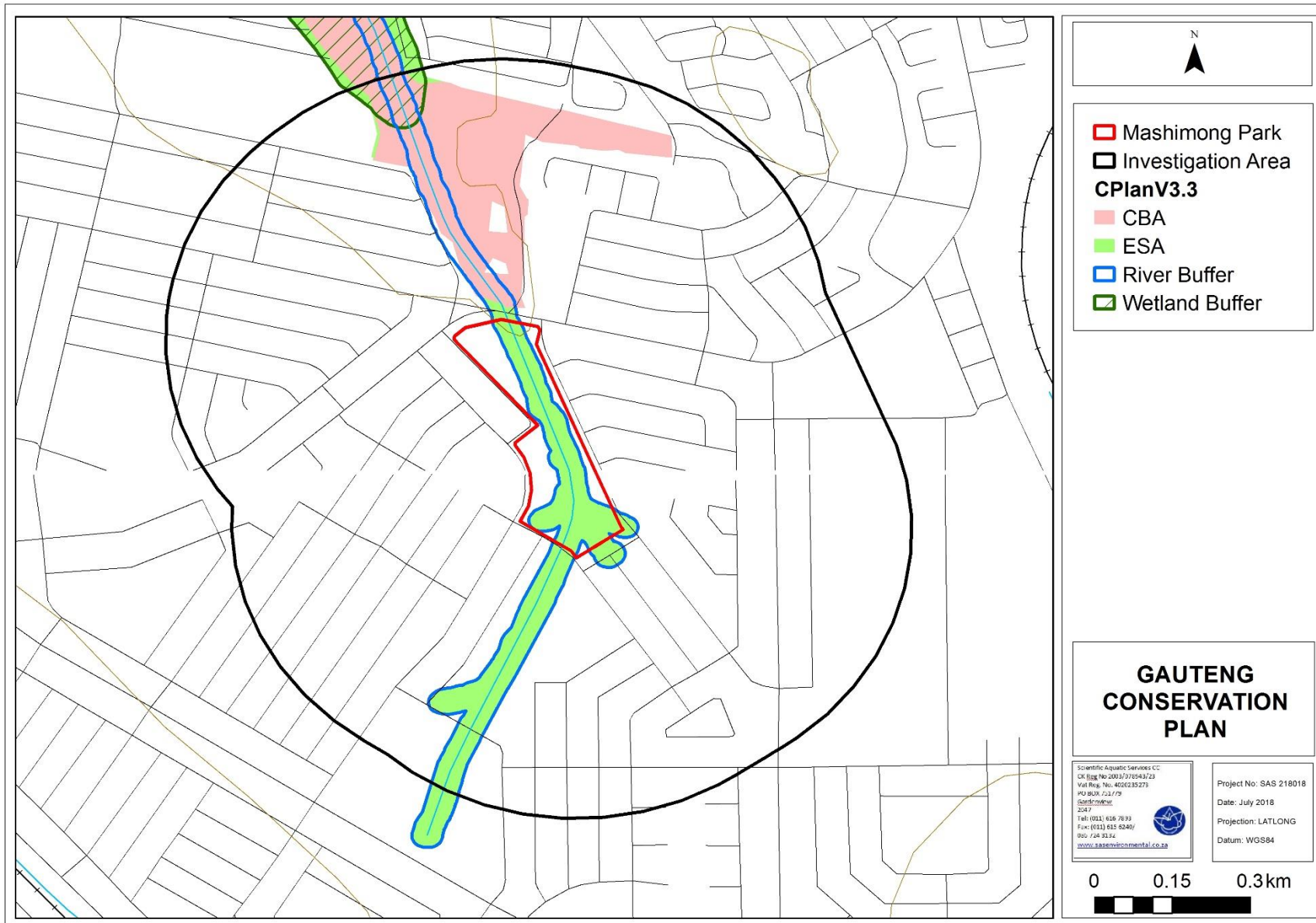


Figure 4: An Ecological Support Area (ESA) and a river buffer is associated with the study area according to the Gauteng C-Plan V3.3 (2011).





## 4 RESULTS: FRESHWATER RESOURCE ASSESSMENT

### 4.1 Freshwater Resource System Characterisation

In preparation for the field assessment, aerial photographs, digital satellite imagery and provincial and national watercourses databases (as outlined in Section 3 of this report) were used to identify areas of interest at a desktop level. A single watercourse was identified to be traversing the study area, draining in a south to north direction. As per historical imagery (Figure 5), this watercourse could have been considered to be a wetland system, however, due to the historical upstream canalisation and impact of the ongoing surrounding urbanisation, this watercourse is now considered to function as a river system. The locality of this river system in relation to the study area is depicted in Figure 6.



**Figure 5: (Left) Historical imagery (circa 1968) of the river system located within the study area. Note that an informal footpath crossing had already been established and the surrounding area to the river had already been developed. (Right) Digital satellite imagery (circa 2017) of the study area, indicating the significant increase of developed area.**

The identified watercourse was therefore classified according to the classification system (Ollis, *et al.*, 2013) as an Inland System, falling within the Highveld Aquatic Ecoregion, and the Dry Highveld Grassland Group 5 WetVeg (wetland vegetation) group, as summarised in the table below.

**Table 2: Characterisation of the watercourse associated with the study area according to the Classification System (Ollis *et. al.*, 2013).**

Watercourse	Level 3: Landscape unit	Level 4: HGM Type
Watercourse within the study area	<b>Valley floor:</b> The base of a valley, situated between two distinct valley side-slopes.	<b>River:</b> a linear landform with clearly discernible bed and banks, which permanently or periodically carries a concentrated flow of water.



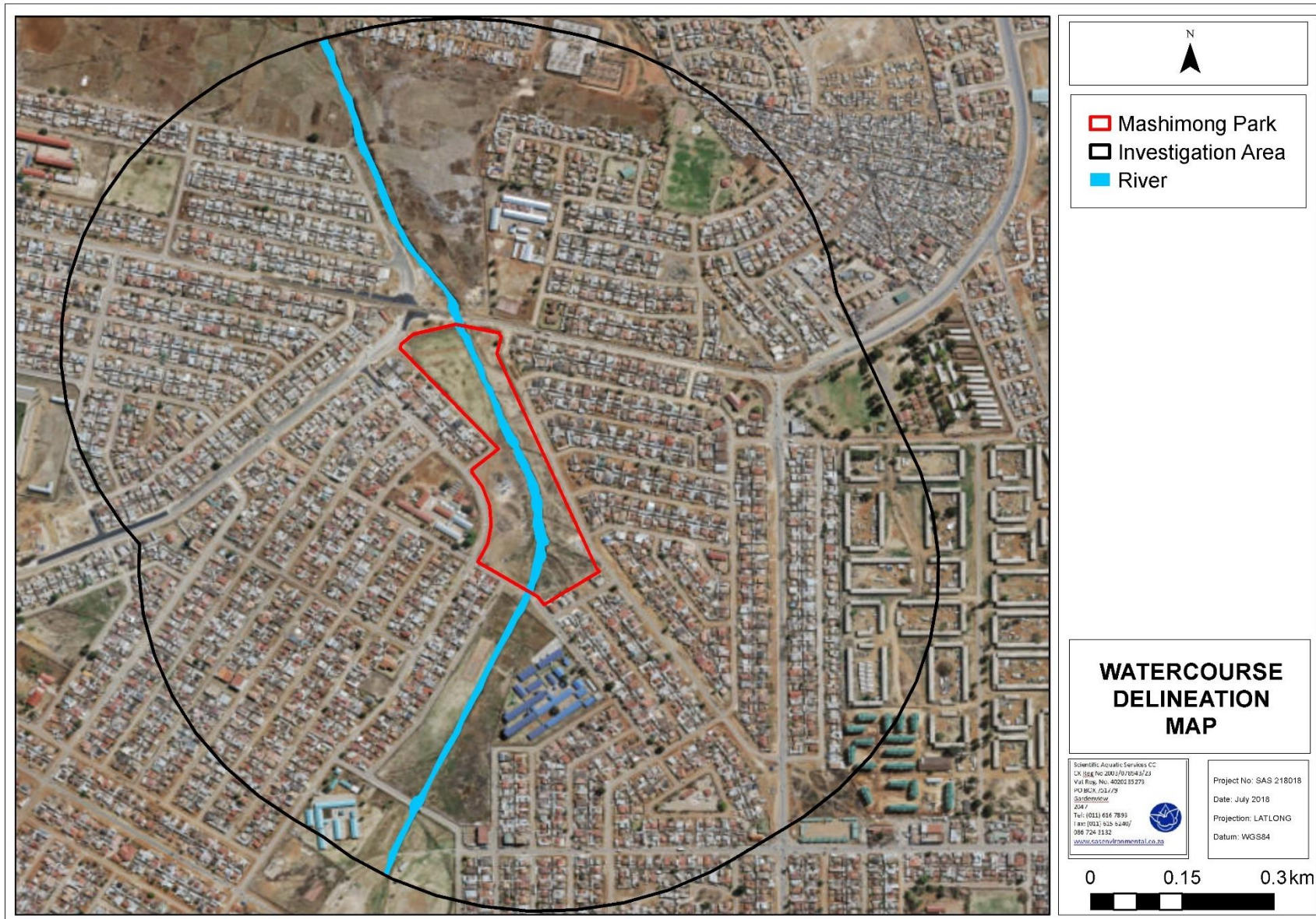


Figure 6: The river system delineated and assessed within the study area (Mashimong Park).



Even though the definition of a riparian area as per that in the National Water Act (1998) states that such systems have vegetation “with a composition and physical structure **distinct** from those of adjacent areas”, in this case, the vegetation composition associated with the river within the study area has been significantly altered to the extent that no riparian vegetation is present, making it difficult to ascertain the exact boundary of a riparian zone. Nevertheless, this watercourse is considered a river due to its distinctive channel and steep embankment (Figure 7).



**Figure 7: Site photographs depicting the overall vegetation within the northern portion (left) and southern portion (right) of the study area. No distinction could be made between the marginal and non-marginal vegetation of the river due to the presence of the invasive grass species *Pennisetum clandestinum* dominating the majority of the surrounding area.**

Several stormwater channels (formal and informal) have been created to convey stormwater from the surrounding impermeable surfaces into this river. These channels are mainly located within the southern portion of the study area (Figures 8 and 9).





**Figure 8: Several stormwater channels (yellow lines) drain into the river system (blue line) within the southern portion of the study area. This has created extensive erosion at the portion where these channels confluence with the river channel.**



**Figure 9: Several large stormwater channels were identified draining into the river channel. Left: A formalized stormwater channel drains water from Freedom Street into the river. Note that at the outlet, the concrete base has been under scoured. Right: A large informal stormwater channel is located within the south-western portion of the study area (from Polaris Street).**

The area surrounding the river is primarily used by the local community as a playground, for informal brick making, as a sorting area for recyclable materials and a small area is fenced off for use as a kraal (Figure 10). The layout of the proposed development still facilitates these informal uses of the area, whilst simultaneously aiming to increase and improve the recreational offerings of the park to the surrounding community. In addition to the aforementioned uses of the park, extensive disposal of building rubble and household refuse is located within the south-western portion of the study area (Figure 11).





**Figure 10: Within the study area, several areas are occupied for a variety of activities such as a playground area (top left), brick making (top right), a kraal for cattle kept by a local resident (bottom right), and a small recycling area (bottom right).**



**Figure 11: Left: The disposal of building rubble and household refuse covers a large extent of the south western portion of the study area. Right: Litter was scattered all over the study area, but it has also accumulated within the river within the study area.**

## **4.2 Field Verification Results**

Following the site visit, various assessments were undertaken to define the characteristics of the watercourse, considering the anticipated historical ecological condition of the system prior to current developments/impacting activities. The assessments undertaken included:

- PES, incorporating aspects such as hydrology, vegetation and geomorphology;
- Service provision of the river, which incorporates biodiversity maintenance, flood attenuation, streamflow regulation and assimilation, to name a few;
- The EIS is guided by the results obtained from the assessment of PES and service provision of the river;
- An appropriate REC to guide the management of the resource with the intent of enhancing the ecological integrity of the resource where feasible; and
- Assessment of impacts of the construction and operation of the proposed development on the watercourse.

The results of the assessments are presented in the “dashboard style” report below.





**Table 3: Summary of the assessment of the portion of the river located within the study area.**

<p><b>Ecological &amp; socio-cultural service provision graph:</b></p>	
<p><b>PES discussion</b></p> <p><b>PES Category: D/E (Largely/Seriously modified)</b></p> <p>Alterations to the overall ecological integrity of this river have taken place, primarily due to the historical canalisation of the system and displacement of naturally occurring vegetation by the alien and invasive Kikuyu grass (<i>Pennisetum clandestinum</i>). Additionally, the edge effects of long-term and ongoing urbanisation have negatively impacted the river, as evidenced by the volumes of household refuse and rubble within and surrounding the system.</p> <p>As depicted by the historical imagery (Figure 5), the river has been impacted for at least 50 years, however, the increased urbanisation in the larger catchment has significantly impacted on the hydrological regime of this river. The vegetation of the river is also altered from its reference condition due to the edge effects of the current land uses as mentioned in the discussion in Section 4.1.</p>	<p><b>Photograph notes</b></p> <p>Representative photographs of the river system located within the study area. Top: A general overview of the southern portion of the river (blue line), into which several stormwater channels drain (yellow lines). Bottom left: Significant erosion (orange arrows) is evident throughout the entire system, but specifically notable where the river drains underneath Reverent R.T.J. Namane Drive. Bottom right: The section of the river within the northern portion of the study area has historically been formalised. However, due to the significant velocity and volume of stormwater entering this system during high flow periods, the surrounding embankment has been eroded, exposing the concrete channel.</p> <p><b>Watercourse driver:</b></p> <p><b>a) Hydrology</b></p> <p>As the upper reaches of this system are surrounded by urbanised areas (catchment hardening), stormwater is considered the main hydrological driver of this system, as runoff arising from surrounding residential developments enters the system. The canalisation of the upstream portions (south of the study area) and the lower section of the river within the northern portion of the study area have had a significant impact on the distribution and retention of water within the river. This canalization has caused a reduction in diffuse surface flow and retention of water by concentrating the flow through the active channel of the river. The canalization has also resulted in channel straightening, which in turn increases the slope of the bed of the channel, leading to the occurrence of headward erosion, resulting in deepening of the natural portions of the channel immediately upstream of the straightened portion, i.e. within the central portion of the river within the study area, also where all the stormwater channels drain into the river.</p>



<p><b>Ecoservice provision</b></p>	<p><b>Moderately Low/Intermediate</b></p> <p>Due to the reduced ecological integrity of this system, functioning remains at a moderately low to intermediate level, particularly in terms of eco-services such as flood attenuation and streamflow regulation. Reduced surface roughness resulting from vegetation losses contributes to the lowered capacity of the system to provide such ecological services, thus high velocity flows erode the active river channel during high rainfall periods.</p> <p>As this river is located within a highly urbanised area, it is considered to have the potential to provide recreational value to the area, particularly if rehabilitation of the system is undertaken during the proposed development.</p>	<p><b>b) Water quality</b></p> <p>Water quality of this river is very likely to be impaired, mainly due to the inflow of contaminated stormwater from the surrounding urbanised areas, including runoff from the brick making and kraal areas. During the site assessment, a sewage odour was observed, however, it could not be ascertained if sewerage is directly released into this river or if it enters the system from surface runoff. Nevertheless, informal discharge of sewage effluent is considered a primary factor in the lowered water quality of the river.</p> <p><b>c) Topography: Geomorphology and sediment balance</b></p> <p>Erosion within the river is extensive, particularly where culvert crossings are located, i.e. within the southern portion (upstream) and northern portion (downstream) of the study area, and also where the stormwater channels confluence with the river within the study area. The area above formalised channel is much broader than the area downstream of it, due to the exacerbated erosion caused by the inflow of water with low suspended loads, thus eroding away the upstream natural channel prior to it being conveyed in the formalised channel.</p>
<p><b>EIS discussion</b></p>	<p><b>EIS Category: C (Moderate).</b></p> <p>The EIS of this river was defined as Category C, which defines resources that are considered to be ecologically important and sensitive on a provincial or local scale, and that the biodiversity of these systems is not usually sensitive to flow and habitat modifications. This category is mainly awarded due to the river being defined as an ESA (Gauteng Conservation Plan, 2014), which provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation. It is the opinion of the ecologist that the EIS of this system rather be considered Low/Marginal (Category D) due to its decreased ecological functioning and sensitivity.</p>	<p><b>d) Habitat and biota</b></p> <p>Disturbances relating to the landscaping and associated removal of naturally occurring vegetation particularly in the playground located in the northern portion of the study area, and the destruction of vegetation due to disposal of building rubble, have led to the transformation of the riparian habitat within and beyond the boundaries of the study area. Isolated patches of reed and sedge species remain within some areas of the active channel of the river, however, the monoculture of Kikuyu grass (<i>Pennisetum clandestinum</i>) surrounding the river has decreased the overall species diversity of the area.</p> <p>Due to the lack of a diversity of habitat types, very few faunal species were noticed during the site assessment, but this is also attributed to the constant human activity within the surrounding area of the river and the poor quality of the surface water within the river.</p> <p><b>Possible significant impacts, Business case, Conclusion and Mitigation Requirements:</b></p>
<p><b>REC Category</b></p>	<p><b>REC Category: D (Largely modified)</b></p> <p>Despite the reduced ecological integrity and functioning of this river, it is still considered to have the potential for providing some ecological importance, specifically with regard to valuable ecoservices such as flood attenuation (provided that the recommended mitigation measures mentioned in this report are implemented), which will in turn directly and/or indirectly increase the value of other ecoservices such as the socio-cultural contribution of the river.</p> <p>The proposed development, if implemented with the provided recommendations and mitigation measures, will contribute to improving the overall ecological condition of the river and therefore increase the overall PES of the river.</p>	<p>As the proposed development will, for the most part, be located outside of the boundaries of the delineated river boundary (with the exception of the proposed pedestrian bridges to cross the river), all activities associated with the construction of the proposed development is considered to be of 'Low' risk significance. Nevertheless, impacts associated with the construction of the walkways within close proximity to the river and the pedestrian bridges crossing the river is considered to impact on the river, albeit also only of 'Low' risk significance. It is highly recommended that the embankments of the river should be resloped to stabilise the embankments and revegetated with indigenous vegetation limit any further erosion from occurring.</p> <p>During the maintenance phase, it is important to monitor the presence of alien and invasive vegetation within the river. If these species become established, they should be eradicated as per the recommendations of the ECO.</p> <p>As litter is located within the river and surrounding area, it is recommended that the recycling area be relocated further from the river. Environmental educational programs can also be initiated to create awareness to limit littering and endorse recycling, and the benefits of freshwater systems.</p> <p>It is the opinion of the freshwater ecologist that the proposed development be considered favourably. If the set-out mitigation measures are implemented throughout the construction and maintenance phases of the development, it is expected that the overall ecological functioning of the river within the study area will improve.</p>





## **4.3 Delineation and Sensitivity Mapping**

### **4.3.1 Delineation**

The delineation of the river as presented in this report is regarded as a best estimate of the riparian zone boundaries based on the site conditions present at the time of assessment.

During the assessment, the following indicators were used to delineate the boundaries of the temporary freshwater zone:

- Terrain units were utilised as the primary determinant to ascertain in which parts of the landscape watercourses would be likely to occur;
- Where feasible, the vegetation indicator was utilised. Due to the extent of vegetation clearing as part of the landscaping and the overall extent of indigenous vegetation removal over time, the vegetation community composition and structure has been significantly transformed therefore the extent of natural vegetation is limited, in turn reducing the dependence on this indicator in this area;
- Due to the degree of disturbances mainly relating to the canalisation of the river (both upstream of the study area, and a portion thereof within the study area) altering the natural hydrological regime of the river, historical and current digital satellite imagery was also utilised to aid in the delineation of certain areas.

### **4.3.2 Legislative Requirements, national and provincial guidelines pertaining to the application of buffer zones**

According to Macfarlane *et al.* (2015) the definition of a buffer zone is variable, depending on the purpose of the buffer zone, however in summary, it is considered to be “a strip of land with a use, function or zoning specifically designed to protect one area of land against impacts from another”. Buffer zones are considered to be important to provide protection of basic ecosystem processes (in this case, the protection of aquatic and wetland ecological services), reduce impacts on water resources arising from upstream activities (e.g. by removing or filtering sediment and pollutants), provision of habitat for aquatic and wetland species as well as for certain terrestrial species, and a range of ancillary societal benefits (Macfarlane *et al.*, 2015). It should be noted, however, that buffer zones are not considered to be effective mitigation against impacts such as hydrological changes arising from stream flow reduction, impoundments or abstraction, nor are they considered to be effective in the management of point-source discharges or contamination of groundwater, both of which require site-specific mitigation measures (Macfarlane *et al.*, 2015).



The definition and motivation for a regulated zone of activity for the protection of watercourses can be summarised as follows:

**Table 4: Articles of Legislation and the relevant zones of regulation applicable to each article.**

Regulatory authorisation required	Zone of applicability
Water Use License Application in terms of the National Water Act	<p>In accordance with GN509 of 2016 as it relates to the NWA, a regulated area of a watercourse for section 21c and 21i of the NWA, 1998 is defined as:</p> <ul style="list-style-type: none"> <li>• the outer edge of the 1 in 100 year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;</li> <li>• in the absence of a determined 1 in 100 year flood line or riparian area the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench; or</li> <li>• a 500m radius from the delineated boundary (extent) of any wetland or pan in terms of this regulation, as well as General Notice no. 509 of 2016 as it relates to the NWA.</li> </ul>
Listed activities in terms of the NEMA (1998) EIA Regulations as amended in April 2017 must be taken into consideration if any activities (for example, stockpiling of soils) are to take place within the applicable zone of regulation. This must be determined by the EAP in consultation with the relevant authorities.	32m from the edge of a watercourse

In addition to the above legislative requirements, according to the GDARD Minimum Requirements for Biodiversity Assessments (2014), a specific setback area is recommended for wetlands and rivers, depending on the location of the freshwater resource in relation to Urban Areas. Although the Urban Edge was rescinded as policy document in the Gauteng Spatial Development Framework in 2011, many municipalities retain an urban edge as part of their municipal spatial development frameworks (Gauteng Growth Management Perspective, 2014) and it is thus considered to provide a useful indicator of where concentration [of development] should occur<sup>3</sup>. Therefore, for the purposes of this report, the Urban Edge and Gauteng Environmental Management Framework boundaries as defined by the Gauteng Conservation Plan Version 3 (2011) and the Gauteng EMF (2015) are utilised as a guideline to inform decision making when recommending or stipulating a suitable setback area around the freshwater resources.

<sup>3</sup> Gauteng Growth Management Perspective, 2014. Retrieved from <http://www.gautengonline.gov.za/Publications/Gauteng%20Spatial%20Development%20Framework%20-%202011.pdf> on 15<sup>th</sup> January 2015



According to the Gauteng C-Plan (2011) and the Gauteng EMF (2015), the study area is located inside of the Urban Edge and inside of the EMF Zone 1 (Urban Development area), thus in terms of the GDARD guidelines, a 32m setback is applicable to the river.

The figure below illustrates the GDARD setback area and GN509 zone of regulation relevant to the portion of the river associated with the proposed development.



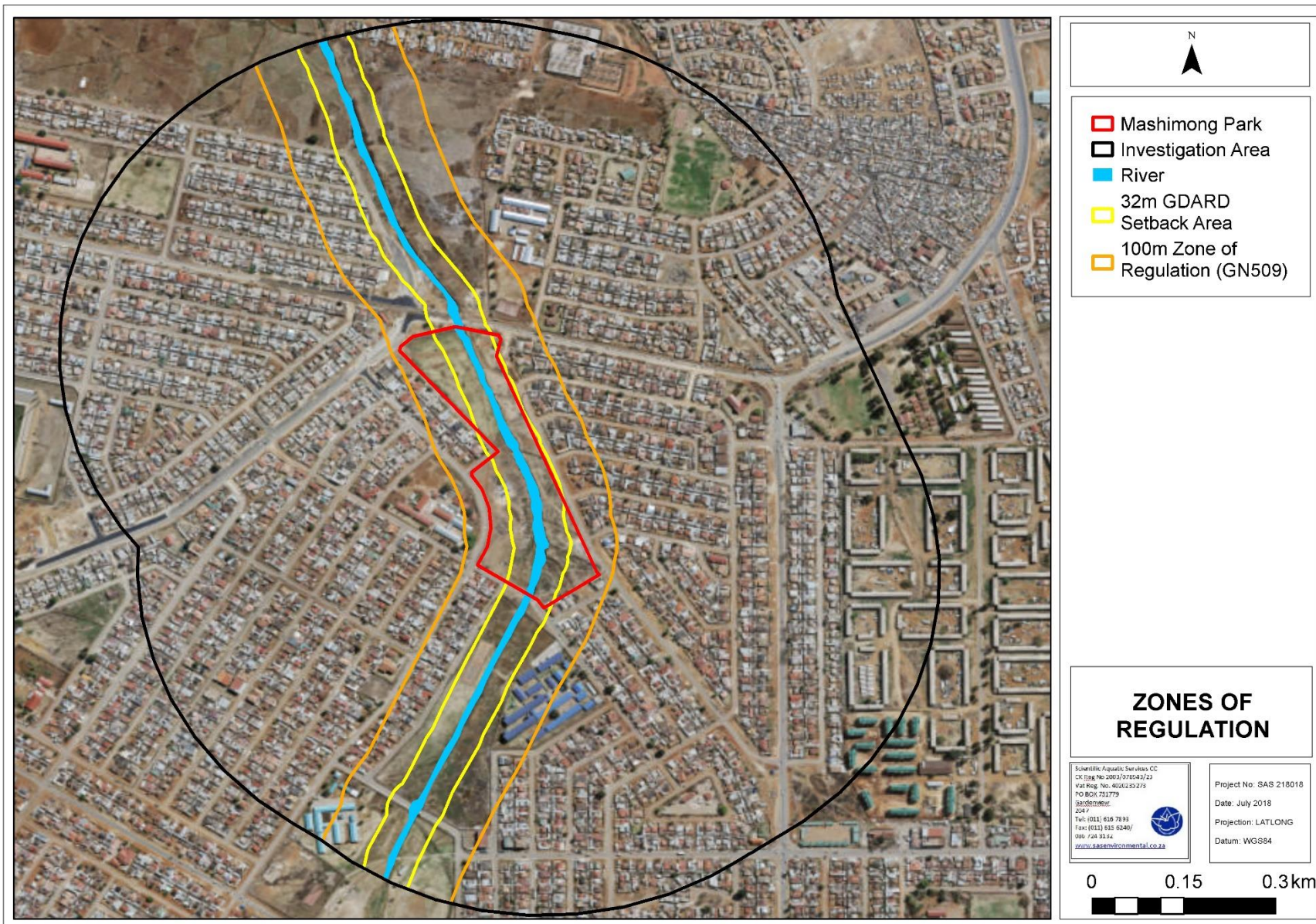


Figure 12: Conceptual presentation of the zones of regulation in terms GN509 of 2016 as it relates to the NWA and GDARD, in relation to the river delineation.





## 5 RISK ASSESSMENT

This section presents the significance of potential impacts on the freshwater ecology of the portion of the river located within the study area. In addition, it also indicates the required mitigatory measures needed to minimise the perceived impacts of the proposed development and presents an assessment of the significance of the impacts taking into consideration the available mitigatory measures and assuming that they are fully implemented.

The risk assessment was based on the initial proposed layout as provided by the proponent, which indicates that two pedestrian bridge crossings would be developed over the river, whilst all other activities would be located outside of the delineated portion of the river but within the 32m GDARD setback area.

### 5.1 Risk Analyses

#### 5.1.1 Consideration of impacts and application of mitigation measures

Following the assessment of the wetland, the DWS approved Risk Assessment Matrix (2016) was applied to ascertain the significance of perceived impacts on the key drivers and receptors (hydrology, water quality, geomorphology, habitat and biota) of the portion of the river within the study area. These results are summarised in Table 4 presented at the end of Section 5.1.2 of this report.

Following the risk assessment, mitigation measures were compiled to serve as guidance throughout the construction and operational phases. The points below summarise the considerations undertaken:

- The risk assessment was applied assuming that all proposed activities would be located outside of the delineated river with the exception of the installation of two pedestrian bridges over the river (however, their supporting columns should also be outside of the river) and resloping of the embankments;
- The risk assessment was applied assuming that a high level of mitigation is implemented, thus the results of the risk assessment provided in this report presents the perceived impact significance *post-mitigation*;
- In applying the risk assessment, it was assumed that the mitigation hierarchy as advocated by the DEA *et al.* (2013) would be followed, i.e. the impacts would be minimised (as the proposed layout does indicate the that two pedestrian bridges would be located across the river, avoidance is not possible), rehabilitated as necessary and offset if required;



- The activities are all highly site specific, not of a significant extent relative to the area of the portion of the river assessed, and therefore have a limited spatial extent;
- While the operation of the Mashimong Park and ancillary activities will be a permanent activity, the construction thereof is envisioned to take no more than a few months. However, the frequency of the construction impacts may be daily during this time;
- Most impacts are considered to be easily detectable;
- The considered mitigation measures are easily practicable;
- It is highly recommended that the proponent make provision for small-scale rehabilitation of the areas of the river which may be directly impacted upon by construction activities and potential edge effects. The area must preferably be rehabilitated to conditions as close as possible to the pre-construction state. This would limit any further impacts from occurring on the river and also increase the stability of the embankments of the river specifically (if revegetated). Furthermore, well-planned, cogent rehabilitation measures, if implemented correctly, will not only improve the ecological functioning of the system, but will improve the aesthetic appeal of the system, thus further contributing to the socio-cultural value thereof.

### **5.1.2 Impact discussion and essential mitigation measures**

There are four key ecological impacts on the river that are anticipated to occur namely,

- Loss of watercourse habitat and ecological structure;
- Changes to the sociocultural and service provision;
- Impacts on the hydrology and sediment balance of the river; and
- Impacts on water quality.

The outcome of the DWS Risk Assessment is summarised in the table below, after which the discussion thereof follows.



**Table 5: Summary of the results of the DWS Risk Assessment applied to the river located within the study area.**

No.	Phases	Activity	Aspect	Impact	Severity	Consequence	Likelihood	Significance	Risk Rating	Control Measures
1	Construction Phase	Site clearing prior to commencement of construction activities.	Removal of vegetation and associated disturbances to soils.	<p>*Exposure of soils, leading to increased runoff and erosion, and thus increased sedimentation of the river;</p> <p>*Increased sedimentation of the river, leading to smothering of biota and potentially altering surface water quality; and</p> <p>*Decreased ecoservice provision (specifically the recreational value of the river)</p>	1	3	4	12	L	<p>*Contractor laydown areas and stockpiles to be established outside of the delineated river and the applicable setback zone in consultation with the appropriate authority;</p> <p>*All development footprint areas to remain as small as possible and vegetation clearing to be limited to what is absolutely essential;</p> <p>*Retain as much indigenous vegetation as possible;</p> <p>*Vehicles to be serviced at the contractor laydown area and all re-fuelling is to take place outside of the river and its applicable setback zone;</p> <p>*It should be feasible to utilise existing roads to gain access to the construction site, and crossing the river in areas where no existing crossing is apparent should be unnecessary;</p> <p>*Sanitation services must be provided for construction personnel, whereby at least one portable toilet will be provided per ten personnel and will be emptied regularly;</p> <p>*Construction personnel must be informed that all litter must be stored immediately and only in closed dustbins, including cigarette ends, and no litter is to remain behind on site following completion of construction activities; and</p> <p>*The river and the applicable setback area should be clearly demarcated with danger tape by an ECO and marked as a 'no-go' area where no construction activities are planned.</p>



No.	Phases	Activity	Aspect	Impact	Severity	Consequence	Likelihood	Significance	Risk Rating	Control Measures
2		Ground-breaking and excavation activities associated with the construction of walkways (outside of the river, within its 32m Setback Area) and pits for the column for the bridge crossings.	*Removal of topsoil; and *Excavation leading to stockpiling of soil; *Disruption of freshwater soils and the embankment of the river.	*Disturbances of soils leading to increased alien vegetation proliferation, and in turn to further altered freshwater habitat; and *Altered runoff patterns and alteration to flow patterns, leading to increased erosion and sedimentation of the river.	2.25	4.25	9	<b>38.25</b>	<b>L</b>	<p>*During excavation activities, the topsoil as well as the vegetation (if indigenous vegetation is present) should be removed up to a depth of 150mm and be stockpiled outside of the GDARD setback area (32m). The vegetation must be kept moist, until it can be used to rehabilitate the embankments or as part of the landscaping activities;</p> <p>*Excavated materials should not be contaminated, and it should be ensured that the minimum surface area is taken up, however the stockpiles may not exceed 2m in height. Mixture of the lower and upper layers of the excavated soil should be kept to a minimum, so as for later usage as backfill material, used to reslope the embankments or as part of the landscaping activities;</p> <p>*All exposed soils must be protected for the duration of the construction phase with a suitable geotextile (e.g. Geojute or hessian sheeting) in order to prevent erosion and sedimentation of the river in close proximity to these stockpiles;</p> <p>*Ensure sediment control devices are in place prior to the start of the excavation activities; and</p> <p>*Maintain sediment/erosion control devices to minimise risk of sedimentation of the downstream river portion by means of silt traps.</p>





No.	Phases	Activity	Aspect	Impact	Severity	Consequence	Likelihood	Significance	Risk Rating	Control Measures
3		Casting of walkways and the supporting columns of the bridge crossings.	<ul style="list-style-type: none"> <li>*Mixing and casting of concrete;</li> <li>*Placement of bedding material;</li> <li>*Backfilling of pits, where after it will be compacted; and</li> <li>*Miscellaneous activities by construction personnel.</li> </ul>	<ul style="list-style-type: none"> <li>*Erosion of areas surrounding the excavated pits;</li> <li>*Potential sedimentation of the river;</li> <li>*Potential impacts on water quality and contamination of soils within the river;</li> <li>*Potential of backfill material to enter the river, increasing the sediment load within the river;</li> <li>*Potential for over-compaction of soils within the river, disrupting the growth medium of the river vegetation</li> </ul>	1.5	3.5	8	<b>28</b>	L	<ul style="list-style-type: none"> <li>*The supporting columns should be installed outside of the river and away from its embankments;</li> <li>*No mixed concrete may be deposited outside of the designated construction footprint;</li> <li>*A batter / dagga board mixing trays and impermeable sumps should be provided, onto which any mixed concrete can be deposited whilst it awaits placing; and</li> <li>*Concrete spilled outside of the demarcated area must be promptly removed and taken to a suitably licensed waste disposal site.</li> </ul>
4		Installation of pre-fabricated steel and wooden pedestrian bridge crossings over the river.	<ul style="list-style-type: none"> <li>*Uncontrolled trampling of vegetation by construction personnel within the river.</li> </ul>	<ul style="list-style-type: none"> <li>*Compaction of river soils, disrupting the growth medium of the river vegetation;</li> <li>*Disruption to the embankment of the river, potentially causing sedimentation of the river.</li> </ul>	1	4	9	<b>36</b>	L	<ul style="list-style-type: none"> <li>*During the installation of the bridges, no personnel may traverse the river channel unnecessarily;</li> <li>*The use of a small crane to lift the bridge structure in place is recommended, provided that it is parked away from the embankment of the river and does not unnecessarily compact or traverse the embankment of the river.</li> </ul>
5		Resloping of the river embankments.	<ul style="list-style-type: none"> <li>*Ongoing disturbances to soils; and</li> <li>*Removal of vegetation.</li> </ul>	<ul style="list-style-type: none"> <li>*Increased sedimentation as a result of disturbances; and</li> <li>*Potential loss of indigenous vegetation (if present) and the further proliferation of alien floral species due to disturbances.</li> </ul>	1.75	4.75	9	<b>42.75</b>	L	<ul style="list-style-type: none"> <li>*Duration of impacts must be minimised;</li> <li>*Re-seed with indigenous species as soon as the resloping activities have been completed; and</li> <li>*Stabilisation of the banks and side slopes are required, by employing techniques, such as: <ul style="list-style-type: none"> <li>• Resloping of banks to a maximum of a 1:3 slope;</li> <li>• revegetation of re-profiled slopes; and</li> <li>• temporary stabilisation of slopes using geotextiles.</li> </ul> </li> </ul>



No.	Phases	Activity	Aspect	Impact	Severity	Consequence	Likelihood	Significance	Risk Rating	Control Measures
6	Operational Phase	Operation and maintenance of the recreational structures associated with Mashimong Park.	Mowing of lawns and general garden upkeep.	*Possible proliferation of invasive and alien species; *Trampling within the river by the groundsman potentially leading to soil disturbances and negatively impacting on vegetation.	1	4	9	36	L	*The lawns and ornamental garden should be maintained by the municipality, on a weekly basis during the summer time and every fortnight during the winter periods; *During the maintenance activities, monitoring for invasive and alien flora species should occur. If some species has been established, it is to be eradicated as recommended by the appointed ECO; and *If litter is noticed during the maintenance activities, it should be cleared and disposed of at a registered land-fill site, or at the recycling area (if the litter is recyclable) within the study area.
7			Maintenance of the walk ways and bridge crossings	*Increased stormwater runoff into the river from the impermeable walk ways.	1	4	9	36	L	*The areas surrounding the always should be well vegetated in order to increase the surface roughness so as to limit the establishment of gullies forming along the walk ways into the river; *The walk ways should regularly be inspected for damage, so as to prevent any material from the walk ways entering the river.
8			Repair of walk ways and bridge crossings	*Impacts as per activity 3 and 4 above as applicable depending upon the location of the repair.	1	4	9	36	L	*Mitigation measures as per activity 3 and 4 above.
9		Operation of the recycling area within close proximity to the river.	Disposal of litter within the river	*Increased pollution of the river channel, impacting on the surface water quality of the river; and *Litter could degrade the habitat integrity of the river.	2.25	5.25	10	52.5	L	*Provision of adequate refuse bins within the study area (i.e. within the playground area, at the braai areas); *Ensure that all refuse and litter are disposed of in accordance with good practice and relevant municipal bylaws; *Develop a community initiative to create awareness of littering and promote recycling of materials at the designated recycling centre within Mashimong Park.



Various activities and development aspects (tabulated in Appendix E) may lead to these impacts, however, provided that the mitigation hierarchy is followed, these impacts can be adequately minimized. The mitigation measures provided in this report have been developed with the mitigation hierarchy in mind, and the implementation and strict adherence to these measures will assist in minimising the significance of impacts on the receiving environment.

As the proposed development will, for the most part, be located outside of the boundaries of the delineated river boundary (with the exception of the proposed pedestrian bridges to cross the river), all activities associated with the construction of the proposed development is considered to be of 'Low' risk significance. Nevertheless, impacts associated with the construction of the walkways within close proximity to the river and the pedestrian bridges crossing the river is considered to impact on the river, albeit also only of 'Low' risk significance.

Activities associated with the development of structures requiring the use of concrete (i.e. the walkways, feature wall, event space area), and impacts associated with spillage of concrete and contamination of soils should be limited through the use of mixing trays and impermeable sumps onto which any mixed concrete can be deposited whilst it awaits placing. If concrete has been spilled outside of the demarcated area, it must be promptly removed and taken to a suitably licensed waste disposal site.

It is recommended that the bridge support columns be placed outside of the river boundary and away from its embankments, in order to limit potential sedimentation of the river during the construction activities, but also to limit erosion from occurring along the columns during the operational phase of the development. During the construction phase it should be ensured that sediment/erosion control devices (i.e. silt traps) are installed and maintained to minimise the risk of impact on the river. The pedestrian bridges to be installed should be similar to the pedestrian bridge crossing the river currently (Figure 13). Pre-fabricated bridges should be installed using a small crane to lift the bridge in place, requiring minimal manual labour and trampling within the river.





**Figure 13: The pedestrian bridge crossing over the river within the study area. Note that the supporting column of this bridge is on the embankment. It is recommended that the supporting columns of the proposed crossings be away from the embankment.**

As part of the development activities, the embankments of the river should be resloped to stabilise the embankments and to limit any further erosion from occurring. If possible, the embankments should be resloped to a maximum of a 1:3 slope and be revegetated with indigenous freshwater vegetation. During these activities, in order to prevent sedimentation of the river, the slopes can temporarily be stabilised using suitable geotextiles. It is also recommended that, in order to increase the overall PES of the river, indigenous freshwater vegetation also be established within the active channel of the river. This will also increase the surface roughness of the channel (thus reducing the velocity of flow and limiting the potential for erosion to occur), but it will also provide habitat for some small faunal species. Short sedge species and obligate wetland grass species should be established rather than large robust reeds species (such as *Typha capensis*), which could impede flow, cause stagnation and the accumulation of debris. A qualified landscape architect and the appointed ECO should be consulted in this regard.

During the maintenance phase, it is important to monitor the presence of alien and invasive vegetation within the river. If these species become established, they should be eradicated as per the recommendations of the ECO. Maintenance of the lawns and ornamental garden should be undertaken regularly in order to ensure that the park is neat and to monitor any areas in which failure of any structures can be noted. If failures have been noted, the appointed ECO should be informed, by which the relevant actions to repair such structures will be initiated.



The locality of the recycling area (as per the proposed development layout – Figure 3) is within close proximity to the river. This facility and the human traffic through the study area has caused increased volumes of litter within the river and surrounding area, and it is therefore recommended that the recycling area be relocated. It is acknowledged that this might not be feasible, as it is an established recycling area, but effort should be made to limit the distribution of unsorted/on-site stored litter from entering the river. Mitigation measures in this regard includes fencing off of the recycling area to prevent the spreading of litter into the river, limit the quantity of materials outside of the recycling area and create community awareness to prevent littering and participation to aid in cleaning up of the river and surrounding area. The relevant municipal officer should be engaged in this regard. It is also recommended to install litter traps within the river, which should be emptied weekly as part of the maintenance activities by the municipality.

Based on the findings of the watercourse ecological assessment, several recommended mitigation measures are made to minimise the impact thereof on the freshwater ecology:

- If feasible, construction must be scheduled for the drier winter period in order to minimise the risk of sediment-laden runoff entering the river as a result of the construction activities;
- Should it be necessary to clear any areas of vegetation, these areas, including contractor laydown areas, must remain as small as possible, to reduce the risk of further proliferation of alien vegetation, and to retain a level of protection to the river during construction (e.g. sediment trapping, slowing of stormwater runoff etc.);
- Contractor laydown areas and all non-essential activities are to remain outside of the delineated river and the 32m allocated setback area, and as much as feasible no natural/indigenous riparian vegetation is to be cleared;
- It is highly recommended that an alien vegetation management plan be compiled during the planning phase and implemented concurrently with the commencement of construction;
- All exposed soils must be protected for the duration of the construction phase with a suitable geotextile (e.g. Geojute or hessian sheeting) to prevent erosion and sedimentation of the river. Soils should not be stockpiled within close proximity to the river, but should rather be outside of the 32m GDARD setback area to prevent sedimentation of the river, and stockpiles may not exceed 2m in height;
- Any remaining soils following the completion of construction activities are to be levelled and re-seeded with indigenous flora species to minimise the risk of further sedimentation of the river, and to aid in the natural reclamation process; and



- Due to the human traffic in the vicinity of the river, volumes of litter do enter the river. Whilst this risk is difficult to mitigate directly, measures such as the following should be considered:
  - Provision of adequate refuse bins within the study area as well as ensuring that all refuse and litter is disposed of in accordance with good practice and relevant municipal bylaws;
  - Initiate community and educational programmes in order to educate the community of the impacts littering may have on the environment and discourage them from disposing of litter inappropriately; and
  - Community and educational programmes focussing on the importance of freshwater systems, and the vital ecological services (such as purification of water) that are provided by these systems.

Additional “good practice” mitigation measures applicable to a project of this nature are provided in Appendix F of this report.

## 6 CONCLUSION

A portion of a river was identified to be located within the study area within which the Mashimong Park development is proposed. Following the assessment of this river, the ecological condition thereof is summarised below.

**Table 6: Summary of results of the field assessment as discussed in Section 4.**

Watercourse	PES	Ecoservices	EIS	REC
River	D/E (Largely/Seriously modified)	Moderately Low/Intermediate	C (Moderate)	D (Largely modified)

For the most part, the river and its surrounding environment are considered to be impacted upon and significantly degraded in terms of ecological functioning. Vegetation clearing and upgradient catchment hardening, road infrastructure and runoff originating from impermeable surfaces are the most frequent, and notable, factors impacting on the river currently.

Following the ecological assessment of the river, the DWS Risk Assessment Matrix (2016) was applied in order to ascertain the significance of possible impacts which may occur as a result of the proposed development. The results of this assessment are presented in Section 5 of this report and show that assuming mitigation measures are strictly enforced, impact significance is of Low significance during both construction and operational phases. Nevertheless, it is considered imperative that suitable mitigation measures, as provided for in



Section 5 and Appendix F of this report, are strictly adhered to if construction as per the proposed layout is authorised, in order to minimise the impacts associated with the development and potential edge effects from occurring.

It is the opinion of the freshwater ecologist that the proposed development be considered favourably. If the set-out mitigation measures are implemented throughout the construction and maintenance phases of the development, it is expected that the overall ecological functioning of the river within the study area will improve.



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## **APPENDIX A Terms of Use and Indemnity**

### **INDEMNITY AND TERMS OF USE OF THIS REPORT**

The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. The report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken and SAS CC and its staff reserve the right to modify aspects of the report including the recommendations if and when new information may become available from ongoing research or further work in this field, or pertaining to this investigation.

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## APPENDIX B - Legislation

### LEGISLATIVE REQUIREMENTS

<p><b>National Environmental Management Act (NEMA) (Act No. 107 of 1998)</b></p>	<p>The National Environmental Management Act (NEMA) (Act 107 of 1998) and the associated Regulations as amended in 2017, states that prior to any development taking place within a wetland or riparian area, an environmental authorisation process needs to be followed. This could follow either the Basic Assessment Report (BAR) process or the Environmental Impact Assessment (EIA) process depending on the scale of the impact. Provincial regulations must also be considered.</p>
<p><b>National Water Act (NWA) (Act No. 36 of 1998)</b></p>	<p>The National Water Act (NWA) (Act 36 of 1998) recognises that the entire ecosystem and not just the water itself in any given water resource constitutes the resource and as such needs to be conserved. No activity may therefore take place within a watercourse unless it is authorised by the Department of Water and Sanitation (DWS). Any area within a wetland or riparian zone is therefore excluded from development unless authorisation is obtained from the DWS in terms of Section 21 (c) &amp; (i).</p>
<p><b>General Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the NWA (Act 36 of 1998)</b></p>	<p>In accordance with Regulation GN509 of 2016, a regulated area of a watercourse for section 21c and 21i of the NWA, 1998 is defined as:</p> <ol style="list-style-type: none"> <li>a) The outer edge of the 1 in 100 year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;</li> <li>b) In the absence of a determined 1 in 100 year flood line or riparian area the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench; or</li> <li>c) A 500 m radius from the delineated boundary (extent) of any wetland or pan.</li> </ol> <p>This notice <b>replaces GN1199</b> and may be exercised as follows:</p> <ol style="list-style-type: none"> <li>i) Exercise the water use activities in terms of Section 21(c) and (i) of the Act as set out in the table below, subject to the conditions of this authorisation;</li> <li>ii) Use water in terms of section 21(c) or (i) of the Act if it has a low risk class as determined through the Risk Matrix;</li> <li>iii) Do maintenance with their existing lawful water use in terms of section 21(c) or (i) of the Act that has a LOW risk class as determined through the Risk Matrix;</li> <li>iv) Conduct river and stormwater management activities as contained in a river management plan;</li> <li>v) Conduct rehabilitation of wetlands or rivers where such rehabilitation activities has a LOW risk class as determined through the Risk Matrix; and</li> <li>vi) Conduct emergency work arising from an emergency situation or incident associated with the persons' existing lawful water use, provided that all work is executed and reported in the manner prescribed in the Emergency protocol.</li> </ol> <p>A General Authorisation (GA) issued as per this notice will require the proponent to adhere with specific conditions, rehabilitation criteria and monitoring and reporting programme. Furthermore, the water user must ensure that there is a sufficient budget to complete, rehabilitate and maintain the water use as set out in this GA.</p> <p>Upon completion of the registration, the responsible authority will provide a certificate of registration to the water user within 30 working days of the submission. On written receipt of a registration certificate from the Department, the person will be regarded as a registered water user and can commence within the water use as contemplated in the GA.</p>
<p><b>GDARD Requirements for Biodiversity Assessments Version 3 (GDARD, 2014).</b></p>	<p>The biodiversity assessment must comply with the minimum requirements as stipulated by GDARD Version 3 of 2014 and must contain the following information:</p> <ul style="list-style-type: none"> <li>➤ The wetland delineation procedure must identify the outer edge of the temporary zone of the wetland, which marks the boundary between the wetland and adjacent terrestrial areas;</li> <li>➤ The delineation must be undertaken according to the DWAF guidelines;</li> <li>➤ The wetland and a protective buffer zone, beginning from the outer edge of the wetland temporary zone, must be designated as sensitive in a sensitivity map. Rules for buffer zone widths are as follows: <ul style="list-style-type: none"> <li>• 30m for wetlands occurring inside urban areas;</li> <li>• 50m for wetlands occurring outside urban areas; and</li> <li>• 50m for priority pans.</li> </ul> </li> </ul>



## APPENDIX C – Method of Assessment

### FRESHWATER RESOURCE METHOD OF ASSESSMENT

#### 1. Desktop Study

Prior to the commencement of the field assessment, a background study, including a literature review, was conducted in order to determine the ecoregion and ecostatus of the larger aquatic system within which the freshwater features present or in close proximity of the proposed study area are located. Aspects considered as part of the literature review are discussed in the sections that follow.

##### 1.1 National Freshwater Ecosystem Priority Areas (NFEPA, 2011)

The NFEPA project is a multi-partner project between the Council of Scientific and Industrial Research (CSIR), Water Research Commission (WRC), South African National Biodiversity Institute (SANBI), DWA, South African Institute of Aquatic Biodiversity (SAIAB) and South African National Parks (SANParks). The project responds to the reported degradation of freshwater ecosystem condition and associated biodiversity, both globally and in South Africa. It uses systematic conservation planning to provide strategic spatial priorities of conserving South Africa's freshwater biodiversity, within the context of equitable social and economic development.

The NFEPA project aims to identify a national network of freshwater conservation areas and to explore institutional mechanisms for their implementation. Freshwater ecosystems provide a valuable, natural resource with economic, aesthetic, spiritual, cultural and recreational value. However, the integrity of freshwater ecosystems in South Africa is declining at an alarming rate, largely as a consequence of a variety of challenges that are practical (managing vast areas of land to maintain connectivity between freshwater ecosystems), socio-economic (competition between stakeholders for utilisation) and institutional (building appropriate governance and co-management mechanisms).

The NFEPA database was searched for information in terms of conservation status of rivers, wetland habitat and wetland features present in the vicinity of or within the proposed study area.

#### 2. Classification System for Wetlands and other Aquatic Ecosystems in South Africa

The freshwater features encountered within the proposed study area were assessed using the Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems (Ollis *et al.*, 2013), hereafter referred to as the "Classification System". A summary of Levels 1 to 4 of the classification system are presented in Table C1 and C2, below.

**Table C1: Proposed classification structure for Inland Systems, up to Level 3.**

WETLAND / AQUATIC ECOSYSTEM CONTEXT		
LEVEL 1: SYSTEM	LEVEL 2: REGIONAL SETTING	LEVEL 3: LANDSCAPE UNIT
Inland Systems	DWA Level 1 Ecoregions OR NFEPA WetVeg Groups OR Other special framework	Valley Floor
		Slope
		Plain
		Bench (Hilltop / Saddle / Shelf)



**Table C2: Hydrogeomorphic (HGM) Unit for the Inland System, showing the primary HGM Types at Level 4A and the subcategories at Level 4B to 4C.**

FUNCTIONAL UNIT		
LEVEL 4: HYDROGEOMORPHIC (HGM) UNIT		
HGM type	Longitudinal zonation/ Landform / Outflow drainage	Landform / Inflow drainage
A	B	C
River	Mountain headwater stream	Active channel
		Riparian zone
	Mountain stream	Active channel
		Riparian zone
	Transitional	Active channel
		Riparian zone
	Upper foothills	Active channel
		Riparian zone
	Lower foothills	Active channel
		Riparian zone
Lowland river	Active channel	
	Riparian zone	
Rejuvenated bedrock fall	Active channel	
	Riparian zone	
Rejuvenated foothills	Active channel	
	Riparian zone	
Upland floodplain	Active channel	
	Riparian zone	
Channelled valley-bottom wetland	(not applicable)	(not applicable)
Unchannelled valley-bottom wetland	(not applicable)	(not applicable)
Floodplain wetland	Floodplain depression	(not applicable)
	Floodplain flat	(not applicable)
Depression	Exorheic	With channelled inflow
		Without channelled inflow
	Endorheic	With channelled inflow
		Without channelled inflow
	Dammed	With channelled inflow
		Without channelled inflow
Seep	With channelled outflow	(not applicable)
	Without channelled outflow	(not applicable)
Wetland flat	(not applicable)	(not applicable)

**Level 1: Inland systems**

From the Classification System, Inland Systems are defined as aquatic ecosystems that have no existing connection to the ocean<sup>4</sup> (i.e. characterised by the complete absence of marine exchange and/or tidal influence) but which are inundated or saturated with water, either permanently or periodically. It is important to bear in mind, however, that certain Inland Systems may have had a historical connection to the ocean, which in some cases may have been relatively recent.

**Level 2: Ecoregions & NFEPA Wetland Vegetation Groups**

For Inland Systems, the regional spatial framework that has been included at Level 2 of the classification system is that of DWA's Level 1 Ecoregions for aquatic ecosystems (Kleynhans *et al.*, 2005). There is a total of 31 Ecoregions across South Africa, including Lesotho and Swaziland. DWA Ecoregions have

<sup>4</sup> Most rivers are indirectly connected to the ocean via an estuary at the downstream end, but where marine exchange (i.e. the presence of seawater) or tidal fluctuations are detectable in a river channel that is permanently or periodically connected to the ocean, it is defined as part of the estuary.





most commonly been used to categorise the regional setting for national and regional water resource management applications, especially in relation to rivers.

The Vegetation Map of South Africa, Swaziland and Lesotho (Mucina & Rutherford, 2006) group's vegetation types across the country according to Biomes, which are then divided into Bioregions. To categorise the regional setting for the wetland component of the National Freshwater Ecosystem Priority Areas (NFEPA) project, wetland vegetation groups (referred to as WetVeg Groups) were derived by further splitting bioregions into smaller groups through expert input (Nel *et al.*, 2011). There are currently 133 NFEPA WetVeg Groups. It is envisaged that these groups could be used as a special framework for the classification of wetlands in national- and regional-scale conservation planning and wetland management initiatives.

### **Level 3: Landscape Setting**

At Level 3 of the Classification System, for Inland Systems, a distinction is made between four Landscape Units (Table C1) on the basis of the landscape setting (i.e. topographical position) within which an HGM Unit is situated, as follows (Ollis *et al.*, 2013):

- **Slope:** an included stretch of ground that is not part of a valley floor, which is typically located on the side of a mountain, hill or valley;
- **Valley floor:** The base of a valley, situated between two distinct valley side-slopes;
- **Plain:** an extensive area of low relief characterised by relatively level, gently undulating or uniformly sloping land; and
- **Bench (hilltop/saddle/shelf):** an area of mostly level or nearly level high ground (relative to the broad surroundings), including hilltops/crests (areas at the top of a mountain or hill flanked by down-slopes in all directions), saddles (relatively high-lying areas flanked by down-slopes on two sides in one direction and up-slopes on two sides in an approximately perpendicular direction), and shelves/terraces/ledges (relatively high-lying, localised flat areas along a slope, representing a break in slope with an up-slope one side and a down-slope on the other side in the same direction).

### **Level 4: Hydrogeomorphic Units**

Seven primary HGM Types are recognised for Inland Systems at Level 4A of the Classification System (Table C2), on the basis of hydrology and geomorphology (Ollis *et al.*, 2013), namely:

- **River:** a linear landform with clearly discernible bed and banks, which permanently or periodically carries a concentrated flow of water;
- **Channelled valley-bottom wetland:** a valley-bottom wetland with a river channel running through it;
- **Unchannelled valley-bottom wetland:** a valley-bottom wetland without a river channel running through it;
- **Floodplain wetland:** the mostly flat or gently sloping land adjacent to and formed by an alluvial river channel, under its present climate and sediment load, which is subject to periodic inundation by over-topping of the channel bank;
- **Depression:** a landform with closed elevation contours that increases in depth from the perimeter to a central area of greatest depth, and within which water typically accumulates.
- **Wetland Flat:** a level or near-level wetland area that is not fed by water from a river channel, and which is typically situated on a plain or a bench. Closed elevation contours are not evident around the edge of a wetland flat; and
- **Seep:** a wetland area located on (gently to steeply) sloping land, which is dominated by the colluvial (i.e. gravity-driven), unidirectional movement of material down-slope. Seeps are often located on the side-slopes of a valley but they do not, typically, extend into a valley floor.

The above terms have been used for the primary HGM Units in the classification system to try and ensure consistency with the wetland classification terms currently in common usage in South Africa. Similar terminology (but excluding categories for “channel”, “flat” and “valleyhead seep”) is used, for example, in the recently developed tools produced as part of the Wetland Management Series including WET-Health (Macfarlane *et al.*, 2008), WET-IHI (DAAF, 2007) and WET-EcoServices (Kotze *et al.*, 2009).



### 3. WET-Health

Healthy wetlands are known to provide important habitats for wildlife and to deliver a range of important goods and services to society. Management of these systems is therefore essential if these attributes are to be retained within an ever-changing landscape. The primary purpose of this assessment is to evaluate the eco-physical health of wetlands, and in so doing to promote their conservation and wise management.

#### Level of Evaluation

Two levels of assessment are provided by WET-Health:

- Level 1: Desktop evaluation, with limited field verification. This is generally applicable to situations where a large number of wetlands need to be assessed at a very low resolution; or
- Level 2: On-site evaluation. This involves structured sampling and data collection in a single wetland and its surrounding catchment.

#### Framework for the Assessment

A set of three modules has been synthesised from the set of processes, interactions and interventions that take place in wetland systems and their catchments: hydrology (water inputs, distribution and retention, and outputs), geomorphology (sediment inputs, retention and outputs) and vegetation (transformation and presence of introduced alien species).

#### Units of Assessment

Central to WET-Health is the characterisation of HGM Units, which have been defined based on geomorphic setting (e.g. hillslope or valley-bottom; whether drainage is open or closed), water source (surface water dominated or sub-surface water dominated) and pattern of water flow through the wetland unit (diffusely or channelled) as described under the Classification System for Wetlands and other Aquatic Ecosystems above.

#### Quantification of Present State of a wetland

The overall approach is to quantify the impacts of human activity or clearly visible impacts on wetland health, and then to convert the impact scores to a Present State score. This takes the form of assessing the spatial extent of the impact of individual activities and then separately assessing the intensity of the impact of each activity in the affected area. The extent and intensity are then combined to determine an overall magnitude of impact. The impact scores, and Present State categories are provided in the table below.



**Table C3: Impact scores and categories of Present State used by WET-Health for describing the integrity of wetlands.**

Impact category	Description	Impact score range	Present State category
None	Unmodified, natural	0-0.9	A
Small	Largely natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place.	1-1.9	B
Moderate	Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place, but the natural habitat remains predominantly intact.	2-3.9	C
Large	Largely modified. A large change in ecosystem processes and loss of natural habitat and biota and has occurred.	4-5.9	D
Serious	The change in ecosystem processes and loss of natural habitat and biota is great, but some remaining natural habitat features are still recognisable.	6-7.9	E
Critical	Modifications have reached a critical level and the ecosystem processes have been completely modified with an almost complete loss of natural habitat and biota.	8-10	F

### Assessing the Anticipated Trajectory of Change

As is the case with the Present State, future threats to the state of the wetland may arise from activities in the catchment upstream of the unit or within the wetland itself or from processes downstream of the wetland. In each of the individual sections for hydrology, geomorphology and vegetation, five potential situations exist depending upon the direction and likely extent of change (table below).

**Table C4: Trajectory of Change classes and scores used to evaluate likely future changes to the present state of the wetland.**

Change Class	Description	HGM change score	Symbol
Substantial improvement	State is likely to improve substantially over the next 5 years	2	↑↑
Slight improvement	State is likely to improve slightly over the next 5 years	1	↑
Remain stable	State is likely to remain stable over the next 5 years	0	→
Slight deterioration	State is likely to deteriorate slightly over the next 5 years	-1	↓
Substantial deterioration	State is expected to deteriorate substantially over the next 5 years	-2	↓↓

### Overall health of the wetland

Once all HGM Units have been assessed, a summary of health for the wetland as a whole needs to be calculated. This is achieved by calculating a combined score for each component by area-weighting the scores calculated for each HGM Unit. Recording the health assessments for the hydrology, geomorphology and vegetation components provide a summary of impacts, Present State, Trajectory of Change and Health for individual HGM Units and for the entire wetland.



#### 4. Wetland Function Assessment

“The importance of a water resource, in ecological social or economic terms, acts as a modifying or motivating determinant in the selection of the management class”.<sup>5</sup> The assessment of the ecosystem services supplied by the identified freshwater features was conducted according to the guidelines as described by Kotze *et al.* (2009). An assessment was undertaken that examines and rates the following services according to their degree of importance and the degree to which the service is provided:

- Flood attenuation;
- Stream flow regulation;
- Sediment trapping;
- Phosphate trapping;
- Nitrate removal;
- Toxicant removal;
- Erosion control;
- Carbon storage;
- Maintenance of biodiversity;
- Water supply for human use;
- Natural resources;
- Cultivated foods;
- Cultural significance;
- Tourism and recreation; and
- Education and research.

The characteristics were used to quantitatively determine the value, and by extension sensitivity, of the freshwater features. Each characteristic was scored to give the likelihood that the service is being provided. The scores for each service were then averaged to give an overall score to the freshwater features.

**Table C5: Classes for determining the likely extent to which a benefit is being supplied.**

Score	Rating of the likely extent to which the benefit is being supplied
<0.5	Low
0.6-1.2	Moderately low
1.3-2	Intermediate
2.1-3	Moderately high
>3	High

#### 5. Ecological Importance and Sensitivity (EIS) (Rountree & Kotze, 2013)

The purpose of assessing importance and sensitivity of water resources is to be able to identify those systems that provide higher than average ecosystem services, biodiversity support functions or are especially sensitive to impacts. Water resources with higher ecological importance may require managing such water resources in a better condition than the present to ensure the continued provision of ecosystem benefits in the long term (Rountree & Kotze, 2013).

In order to align the outputs of the Ecoservices assessment (i.e. ecological and socio-cultural service provision) with methods used by the DWA (now the DWS) used to assess the EIS of other watercourse types, a tool was developed using criteria from both WET-Ecoservices (Kotze, *et al.*, 2009) and earlier DWA EIA assessment tools. Thus, three proposed suites of important criteria for assessing the Importance and Sensitivity for wetlands were proposed, namely:

<sup>5</sup> Department of Water Affairs and Forestry, South Africa Version 1.0 of Resource Directed Measures for Protection of Water Resources, 1999





- Ecological Importance and Sensitivity, incorporating the traditionally examined criteria used in EIS assessments of other water resources by DWA and thus enabling consistent assessment approaches across water resource types;
- Hydro-functional importance, taking into consideration water quality, flood attenuation and sediment trapping ecosystem services that the wetland may provide; and
- Importance in terms of socio-cultural benefits, including the subsistence and cultural benefits provided by the wetland system.

The highest of these three suites of scores is then used to determine the overall Importance and Sensitivity category (Table C8) of the wetland system being assessed.

**Table C6: Ecological Importance and Sensitivity Categories and the interpretation of median scores for biota and habitat determinants (adapted from Kleynhans, 1999).**

EIS Category	Range of Mean	Recommended Ecological Management Class
<u>Very high</u> Wetlands that are considered ecologically important and sensitive on a national or even international level. The biodiversity of these wetlands is usually very sensitive to flow and habitat modifications.	>3 and ≤4	A
<u>High</u> Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these wetlands may be sensitive to flow and habitat modifications.	>2 and ≤3	B
<u>Moderate</u> Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these wetlands is not usually sensitive to flow and habitat modifications.	>1 and ≤2	C
<u>Low/marginal</u> Wetlands that are not ecologically important and sensitive at any scale. The biodiversity of these wetlands is ubiquitous and not sensitive to flow and habitat modifications.	>0 and ≤1	D

## 6. Recommended Ecological Category (REC)

“A high management class relates to the flow that will ensure a high degree of sustainability and a low risk of ecosystem failure. A low management class will ensure marginal maintenance of sustainability, but carries a higher risk of ecosystem failure.”<sup>6</sup>

The REC (Table C7) was determined based on the results obtained from the PES, reference conditions and EIS of the resource (sections above). Followed by realistic recommendations, mitigation, and rehabilitation measures to achieve the desired REC.

A freshwater feature may receive the same class for the PES as the REC if the freshwater feature is deemed in good condition, and therefore must stay in good condition. Otherwise, an appropriate REC should be assigned in order to prevent any further degradation as well as enhance the PES of the freshwater feature.

<sup>6</sup> Department of Water Affairs and Forestry, South Africa Version 1.0 of Resource Directed Measures for Protection of Water Resources 1999



**Table C7: Description of REC classes.**

Class	Description
A	Unmodified, natural
B	Largely natural with few modifications
C	Moderately modified
D	Largely modified

## 7. Wetland and Riparian Delineation

The freshwater resource delineation took place according to the method presented in the “Updated manual for the identification and delineation of wetland and riparian resources” published by DWAF in 2008. The foundation of the method is based on the fact that wetlands and riparian zones have several distinguishing factors including the following:

- The presence of water at or near the ground surface;
- Distinctive hydromorphic soils;
- Vegetation adapted to saturated soils; and
- The presence of alluvial soils in stream systems.

According to the DWA (2005) like wetlands, riparian areas have their own unique set of indicators. It is possible to delineate riparian areas by checking for the presence of these indicators. Some areas may display both wetland and riparian indicators, and can accordingly be classified as both. If you are adjacent to a watercourse, it is important to check for the presence of the riparian indicators described below, in addition to checking for wetland indicators, to detect riparian areas that do not qualify as wetlands. The delineation process requires that the following be taken into account:

- topography associated with the watercourse;
- vegetation; and
- alluvial soils and deposited material.

By observing the evidence of these features in the form of indicators, wetlands and riparian zones can be delineated and identified. If the use of these indicators and the interpretation of the findings are applied correctly, then the resulting delineation can be considered accurate (DWA, 2005).



## APPENDIX D – Risk Assessment Methodology

In order for the EAP to allow for sufficient consideration of all environmental impacts, impacts were assessed using a common, defensible method of assessing significance that will enable comparisons to be made between risks/impacts and will enable authorities, stakeholders and the client to understand the process and rationale upon which risks/impacts have been assessed. The method to be used for assessing risks/impacts is outlined in the sections below.

The first stage of the risk/impact assessment is the identification of environmental activities, aspects and impacts. This is supported by the identification of receptors and resources, which allows for an understanding of the impact pathway and an assessment of the sensitivity to change. The definitions used in the impact assessment are presented below.

- An **activity** is a distinct process or task undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or infrastructure that is possessed by an organisation.
- An **environmental aspect** is an ‘element of an organizations activities, products and services which can interact with the environment’<sup>7</sup>. The interaction of an aspect with the environment may result in an impact.
- **Environmental risks/impacts** are the consequences of these aspects on environmental resources or receptors of particular value or sensitivity, for example, disturbance due to noise and health effects due to poorer air quality. In the case where the impact is on human health or wellbeing, this should be stated. Similarly, where the receptor is not anthropogenic, then it should, where possible, be stipulated what the receptor is.
- **Receptors** can comprise, but are not limited to, people or human-made systems, such as local residents, communities and social infrastructure, as well as components of the biophysical environment such as freshwater features, flora and riverine systems.
- **Resources** include components of the biophysical environment.
- **Frequency of activity** refers to how often the proposed activity will take place.
- **Frequency of impact** refers to the frequency with which a stressor (aspect) will impact on the receptor.
- **Severity** refers to the degree of change to the receptor status in terms of the reversibility of the impact; sensitivity of receptor to stressor; duration of impact (increasing or decreasing with time); controversy potential and precedent setting; threat to environmental and health standards.
- **Spatial extent** refers to the geographical scale of the impact.
- **Duration** refers to the length of time over which the stressor will cause a change in the resource or receptor.

The significance of the impact is then assessed by rating each variable numerically according to the defined criteria (refer to the table below). The purpose of the rating is to develop a clear understanding of influences and processes associated with each impact. The severity, spatial scope and duration of the impact together comprise the consequence of the impact and when summed can obtain a maximum value of 15. The frequency of the activity, impact, legal issues and the detection of the impact together comprise the likelihood of the impact occurring and can obtain a maximum value of 20. The values for likelihood and consequence of the impact are then read off a significance rating matrix and are used to determine whether mitigation is necessary<sup>8</sup>.

The model outcome of the impacts was then assessed in terms of impact certainty and consideration of available information. The Precautionary Principle is applied in line with South Africa’s National Environmental Management Act (No. 108 of 1997) in instances of uncertainty or lack of information, by

<sup>7</sup> The definition has been aligned with that used in the ISO 14001 Standard.

<sup>8</sup> Some risks/impacts that have low significance will however still require mitigation



increasing assigned ratings or adjusting final model outcomes. In certain instances, where a variable or outcome requires rational adjustment due to model limitations, the model outcomes have been adjusted.

**"RISK ASSESSMENT KEY"** (Based on DWS 2015 publication: Section 21 c and i water use Risk Assessment Protocol)

**Table D1: Severity (How severe does the aspects impact on the resource quality (flow regime, water quality, geomorphology, biota, habitat)**

Insignificant / non-harmful	1
Small / potentially harmful	2
Significant / slightly harmful	3
Great / harmful	4
Disastrous / extremely harmful and/or wetland(s) involved	5
<b>Where "or wetland(s) are involved" it means that the activity is located within the delineated boundary of any wetland. The score of 5 is only compulsory for the significance rating.</b>	

**Table D2: Spatial Scale (How big is the area that the aspect is impacting on)**

Area specific (at impact site)	1
Whole site (entire surface right)	2
Regional / neighbouring areas (downstream within quaternary catchment)	3
National (impacting beyond secondary catchment or provinces)	4
Global (impacting beyond SA boundary)	5

**Table D3: Duration (How long does the aspect impact on the resource quality)**

One day to one month, PES, EIS and/or REC not impacted	1
One month to one year, PES, EIS and/or REC impacted but no change in status	2
One year to 10 years, PES, EIS and/or REC impacted to a lower status but can be improved over this period through mitigation	3
Life of the activity, PES, EIS and/or REC permanently lowered	4
More than life of the organisation/facility, PES and EIS scores, a E or F	5
<b>PES and EIS (sensitivity) must be considered.</b>	

**Table D4: Frequency of the activity (How often do you do the specific activity)**

Annually or less	1
6 monthly	2
Monthly	3
Weekly	4
Daily	5

**Table D5: The frequency of the incident or impact (How often does the activity impact on the resource quality)**

Almost never / almost impossible / >20%	1
Very seldom / highly unlikely / >40%	2
Infrequent / unlikely / seldom / >60%	3
Often / regularly / likely / possible / >80%	4
Daily / highly likely / definitely / >100%	5

**Table D6: Legal issues (How is the activity governed by legislation)**

No legislation	1
Fully covered by legislation (wetlands are legally governed)	5
<b>Located within the regulated areas</b>	





**Table D7: Detection (How quickly or easily can the impacts/risks of the activity be observed on the resource quality, people and resource)**

Immediately	1
Without much effort	2
Need some effort	3
Remote and difficult to observe	4
Covered	5

**Table D8: Rating Classes**

RATING	CLASS	MANAGEMENT DESCRIPTION
1 – 55	(L) Low Risk	Acceptable as is or consider requirement for mitigation. Impact to watercourses and resource quality small and easily mitigated.
56 – 169	(M) Moderate Risk	Risk and impact on watercourses are notably and require mitigation measures on a higher level, which costs more and require specialist input. Licence required.
170 – 300	(H) High Risk	Watercourse(s) impacts by the activity are such that they impose a long-term threat on a large scale and lowering of the Reserve. Licence required.

**A low risk class must be obtained for all activities to be considered for a GA**

**Table D9: Calculations**

Consequence = Severity + Spatial Scale + Duration
Likelihood = Frequency of Activity + Frequency of Incident + Legal Issues + Detection
Significance/Risk = Consequence X Likelihood

The following points were considered when undertaking the assessment:

- Risks and impacts were analysed in the context of the *project's area of influence* encompassing:
  - Primary project site and related facilities that the client and its contractors develops or controls;
  - Areas potentially impacted by cumulative impacts for further planned development of the project, any existing project or condition and other project-related developments; and
  - Areas potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location.
- Risks/Impacts were assessed for construction phase and operational phase; and
  - Individuals or groups who may be differentially or disproportionately affected by the project because of their disadvantaged or vulnerable status were assessed.

### **Control Measure Development**

The following points presents the key concepts considered in the development of mitigation measures for the proposed construction:

- Mitigation and performance improvement measures and actions that address the risks and impacts<sup>9</sup> are identified and described in as much detail as possible. Mitigating measures are investigated according to the impact minimisation hierarchy as follows:
  - Avoidance or prevention of impact;
  - Minimisation of impact;
  - Rehabilitation; and
  - Offsetting.
- Measures and actions to address negative impacts will favour avoidance and prevention over minimisation, mitigation or compensation; and

<sup>9</sup> Mitigation measures should address both positive and negative impacts



- Desired outcomes are defined, and have been developed in such a way as to be measurable events with performance indicators, targets and acceptable criteria that can be tracked over defined periods, wherever possible.

***Recommendations***

Recommendations were developed to address and mitigate potential impacts on the freshwater ecology of the resources in traversed by or in close proximity of the proposed infrastructure.



## APPENDIX E – Results of Field Investigation

### PRESENT ECOLOGICAL STATE (PES) AND ECOLOGICAL IMPORTANCE AND SENSITIVITY (EIS) RESULTS

Table E1: Summary of the results from the WET-Health assessment of the portion of the river within the study area

HGM Unit	Ha	Extent (%)	Hydrology		Geomorphology		Vegetation	
			Impact Score	Change Score	Impact Score	Change Score	Impact Score	Change Score
1	1,6	100	6,0	-1	5,1	-1	6,6	-1
Area weighted impact scores*			6,0	-1	5,1	-1	6,6	-1
PES Category			E	↓	D	↓↓	E	↓↓

Table E2: Presentation of the results of the Ecoservices assessment applied to the portion of the river within the study area

Ecosystem service	River
Flood attenuation	1,9
Streamflow regulation	2,0
Sediment trapping	1,8
Phosphate assimilation	1,6
Nitrate assimilation	1,7
Toxicant assimilation	1,6
Erosion control	1,4
Carbon Storage	1,0
Biodiversity maintenance	0,9
Water Supply	1,0
Harvestable resources	0,6
Cultivated foods	0,6
Cultural value	1,0
Tourism and recreation	1,0
Education and research	1,0
<b>SUM</b>	<b>19,1</b>
<b>Average score</b>	<b>1,3</b>



**Table E3: Presentation of the results of the EIS assessment applied to the portion of the river within the study area**

FRESHWATER FEATURE:		River	
Ecological Importance and Sensitivity		Score (0-4)	
Biodiversity support		<b>A (average)</b>	
		0,00	
<i>Presence of Red Data species</i>		0	
<i>Populations of unique species</i>		0	
<i>Migration/breeding/feeding sites</i>		0	
Landscape scale		<b>B (average)</b>	
		1,00	
<i>Protection status of the wetland</i>		1	
<i>Protection status of the vegetation type</i>		1	
<i>Regional context of the ecological integrity</i>		1	
<i>Size and rarity of the wetland type/s present</i>		1	
<i>Diversity of habitat types</i>		1	
Sensitivity of the wetland		<b>C (average)</b>	
		1,00	
<i>Sensitivity to changes in floods</i>		1	
<i>Sensitivity to changes in low flows/dry season</i>		1	
<i>Sensitivity to changes in water quality</i>		1	
<b>ECOLOGICAL IMPORTANCE &amp; SENSITIVITY (max of A,B or C)</b>		<b>B (1)</b>	
Hydro-Functional Importance		Score (0-4)	
Regulating & supporting benefits	Flood attenuation	2	
	Streamflow regulation	2	
	Water Quality Enhancement	<i>Sediment trapping</i>	1
		<i>Phosphate assimilation</i>	1
		<i>Nitrate assimilation</i>	1
		<i>Toxicant assimilation</i>	1
		<i>Erosion control</i>	1
	Carbon storage	1	
<b>HYDRO-FUNCTIONAL IMPORTANCE (average score)</b>		<b>1</b>	
Direct Human Benefits		Score (0-4)	
Subsistence benefits	<i>Water for human use</i>	0	
	<i>Harvestable resources</i>	1	
	<i>Cultivated foods</i>	0	
Cultural benefits	<i>Cultural heritage</i>	1	
	<i>Tourism and recreation</i>	1	
	<i>Education and research</i>	1	
<b>DIRECT HUMAN BENEFITS (average score)</b>		<b>1,50</b>	





## APPENDIX F – Risk Assessment and Mitigation Measures

### General construction management and good housekeeping practices

Latent and general impacts which may affect the freshwater ecology and biodiversity, will include any activities which take place in close proximity to the proposed development that may impact on the receiving environment. Mitigation measures for these impacts are highlighted below and are relevant to the freshwater system identified in this report:

### Development footprint

- All development footprint areas should remain as small as possible and should not encroach into the freshwater areas unless absolutely essential and part of the proposed development. It must be ensured that the freshwater habitat is off-limits to construction vehicles and non-essential personnel;
- The boundaries of footprint areas, including contractor laydown areas, are to be clearly defined and it should be ensured that all activities remain within defined footprint areas. Edge effects will need to be extremely carefully controlled;
- Planning of temporary roads and access routes should avoid freshwater areas and be restricted to existing roads where possible;
- Appropriate sanitary facilities must be provided for the life of the construction phase and all waste removed to an appropriate waste facility;
- All hazardous chemicals as well as stockpiles should be stored on bunded surfaces and have facilities constructed to control runoff from these areas;
- It must be ensured that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage;
- No fires should be permitted in or near the construction area; and
- Ensuring that an adequate number of waste and “spill” bins are provided will also prevent litter and ensure the proper disposal of waste and spills.

### Vehicle access

- All vehicles must be regularly inspected for leaks. Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into the topsoil;
- In the event of a vehicle breakdown, maintenance of vehicles must take place with care and the recollection of spillage should be practiced near the surface area to prevent ingress of hydrocarbons into topsoil and subsequent habitat loss; and
- All spills should they occur, should be immediately cleaned up and treated accordingly.

### Vegetation

- Proliferation of alien and invasive species is expected within any disturbed areas. As the vegetation component within the freshwater environment is already transformed mainly due to the landscaping practices. However, alien invasive species are opportunistic, and where disturbances do occur, they will propagate; therefore, these species should be eradicated and controlled to prevent their spread beyond the project footprint. Alien plant seed dispersal within the top layers of the soil within footprint areas, that will have an impact on future rehabilitation, has to be controlled;
- Removal of the alien and weed species encountered within the freshwater resources must take place in order to comply with existing legislation (amendments to the regulations under the Conservation of Agricultural Resources Act, 1983 and Section 28 of the National Environmental Management Act, 1998). Removal of species should take place throughout the construction, operational, and maintenance phases; and
- Species specific and area specific eradication recommendations:
  - Care should be taken with the choice of herbicide to ensure that no additional impact and loss of indigenous plant species occurs due to the herbicide used;



- Footprint areas should be kept as small as possible when removing alien plant species; and
- No vehicles should be allowed to drive through designated sensitive wetland areas during the eradication of alien and weed species.

**Soils**

- Sheet runoff from access roads and the walk ways should be slowed down by the strategic placement of berms;
- As far as possible, all construction activities should occur in the low flow season, during the drier winter months;
- As much vegetation growth as possible (of indigenous floral species) should be encouraged to protect soils;
- No stockpiling of topsoil is to take place within close proximity to the wetland, and all stockpiles must be protected with a suitable geotextile to prevent sedimentation of the wetland;
- All soils compacted as a result of construction activities as well as ongoing operational activities falling outside of project footprint areas should be ripped and profiled; and
- A monitoring plan for the development and the immediate zone of influence should be implemented to prevent erosion and incision.

**Rehabilitation**

- Construction rubble must be collected and disposed of at a suitable landfill site; and
- All alien vegetation in the footprint area as well as immediate vicinity of the proposed development should be removed. Alien vegetation control should take place for a minimum period of two growing seasons after rehabilitation is completed;
- Side slope and embankment vegetation cover should be monitored to ensure that sufficient vegetation is present to bind these soils and prevent further erosion;



## APPENDIX G – Specialist information

### DETAILS, EXPERTISE AND CURRICULUM VITAE OF SPECIALISTS

#### 1. (a) (i) Details of the specialist who prepared the report

Stephen van Staden MSc (Environmental Management) (University of Johannesburg)

Christel du Preez MSc (Environmental Sciences) (North West University)

#### 1. (a). (ii) The expertise of that specialist to compile a specialist report including a curriculum vitae

Company of Specialist:	Scientific Aquatic Services		
Name / Contact person:	Stephen van Staden		
Postal address:	29 Arterial Road West, Oriel, Bedfordview		
Postal code:	2007	Cell:	083 415 2356
Telephone:	011 616 7893	Fax:	011 615 6240/ 086 724 3132
E-mail:	stephen@sasenvgroup.co.za		
Qualifications	MSc (Environmental Management) (University of Johannesburg) BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg) BSc (Zoology, Geography and Environmental Management) (University of Johannesburg)		
Registration / Associations	Registered Professional Natural Scientist at South African Council for Natural Scientific Professions (SACNASP) Accredited River Health Practitioner by the South African River Health Program (RHP) Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum		





**SCIENTIFIC AQUATIC SERVICES (SAS) – SPECIALIST CONSULTANT INFORMATION**  
**CURRICULUM VITAE OF STEPHEN VAN STADEN**

**PERSONAL DETAILS**

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Position in Company	Managing member, Ecologist, Aquatic Ecologist
Date of Birth	13 July 1979
Nationality	South African
Languages	English, Afrikaans
Joined SAS	2003 (year of establishment)
Other Business	Trustee of the Serenity Property Trust

**MEMBERSHIP IN PROFESSIONAL SOCIETIES**

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Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP)  
 Accredited River Health practitioner by the South African River Health Program (RHP)  
 Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum  
 Member of IAIA South Africa

**EDUCATION**

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**Qualifications**

MSc (Environmental Management) (University of Johannesburg)	2003
BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg)	2001
BSc (Zoology, Geography and Environmental Management) (University of Johannesburg)	2000
Tools for wetland Assessment short course Rhodes University	2016

**COUNTRIES OF WORK EXPERIENCE**

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South Africa – All Provinces  
 Southern Africa – Lesotho, Botswana, Mozambique, Zimbabwe Zambia  
 Eastern Africa – Tanzania Mauritius  
 West Africa – Ghana, Liberia, Angola, Guinea Bissau, Nigeria, Sierra Leona  
 Central Africa – Democratic Republic of the Congo





## SELECTED PROJECT EXAMPLES

Client	Project	Project Description	Area
<b>RESIDENTIAL</b>			
GIBB (PTY) LTD	Bloemwater Knelpoort Project	Full ECO Assessment	Free State
DLC Town Plan (Pty) Ltd	Bongwini and Toekomsrus Project Gold 1	Environmental Sensitivity Analyses as part of the development of site Development Plans and Precinct Planning on the outskirts of Takoradi Ghana (2000 ha)	Randfontein
SRK Consulting (PTY) Ltd	Skoenmaker River	Wetland, Aquatic & ECO Assessment	Somerset East
Century Property Development	The Hills Eco Estate	Wetland delineation and ecological assessment, and rehabilitation plan	Midrand, Gauteng
<b>ROADS, PIPELINES, POWERLINES AND OTHER LINEAR DEVELOPMENTS</b>			
Delta Built Environment Consultants	Lesotho Border Road Project	Soil & Land Capability Assessment, full wetland ecological assessment and aquatic assessment as part of the EIA process	Lesotho
Spoor Environmental	Thabazimbi Waste Water Treatment Works; Upgrade of Sewer Pipeline	Freshwater resource ecological assessment and rehabilitation and management plan	Limpopo
Royal Haskoning DHV (Pty) Ltd	N11 Ring Road	Freshwater Ecological Assessment	Limpopo
Chameleon Environmental	N7 Road Upgrade Cederberg & Kransvleikloof	Floral RDL scan and delineation of the wetland areas along the proposed N7 road upgrade between Clanwilliam and Citrusdal	Western Cape
Iiso Consulting (Pty Ltd)	N3TC De Beers Pass Route	Variation order for additional work on N3TC De Beers pass route and existing N3 route	Kwa-Zulu Natal
<b>MINING</b>			
Anglo Platinum	Der Brochen Mine	Ongoing bi-annual seasonal aquatic biomonitring from 2011 to present	Steelport Limpopo
Anglo Platinum	Der Brochen Mine	Wetland Ecological Assessment (2014) Full terrestrial, wetland and aquatic ecological assessment, soil and land capability assessment (2018)	Steelport, Limpopo
Bokoni Platinum Mine	Bokoni Platinum Mine	Annual Soil Monitoring & Soil Contamination	Free State
GIBB (PTY) LTD	Rustenburg Bridges	Aquatic Biomonitring Assessment	Rustenburg, North West
Assmang Chrome Machadodorp	Assmang Chrome Machadodorp Works	Biomonitring & Toxicological Monitoring for the 2015 period	Machadodorp, Mpumalanga
Globesight Advisory, Consulting & Training	Sabie TGME Project	Freshwater Ecological Assessment as part of the environmental assessment and authorization process for the proposed development (gold mining project – pre-mined residue and hard rock mining near Sabie)	Mpumalanga
Ikwezi Mining (Pty) Ltd	Ikwezi Doornkop Colliery	Develop freshwater resource rehabilitation and management plans, and conduct ecological biomonitring in fulfillment of the water use licensing process for the Ikwezi Doornkop Colliery near Newcastle	Newcastle
Sappi Southern Africa (Pty) Ltd	Blesbokspruit Enstra Mill	Biomonitring studies, whole effluent toxicity (WET) studies, bioaccumulation assessment and sediment heavy metal contaminant analyses	Johannesburg
Stibium Mining	Malati Opencast	Freshwater ecological assessment, risk assessment and freshwater rehabilitation and management plan and plant species plan as part of the water use authorization process for a proposed Malati opencast near Tzaneen	Limpopo
EXM Advisory Services	Heuningkranz Mine	Freshwater assessment, soil and land capability assessment done for Sishen Iron Ore Company (Pty) Ltd part of Kumba Iron Ore limited as part of the environmental management services for the Heuningkranz project	Northern Cape
Shangoni Management Services (Pty) Ltd	Leslie Colliery	Project manager, freshwater ecological assessment as part of the environmental impact assessment process for the underground coal mine to determine the status of the freshwater resources within the proposed mining area	Mpumalanga



SLR Consulting (Africa) (Pty) Ltd	Commissiekraal Colliery	Full Ecological investigation, including a terrestrial fauna and flora assessment as well as an assessment of the wetland and aquatic PES and wetland ecoservices on the site.	Kwa-Zulu Natal
Jacana Environmental CC	Leandra Colliery	Full Ecological Assessment, including a terrestrial fauna and flora assessment as well as an assessment of the wetland and aquatic PES and wetland ecoservices on the site.	Mpumalanga
SRK Consulting (PTY) Ltd	Marula Platinum Mine	Freshwater resource ecological assessment. Development of a plant species plan in line with the project's rehabilitation objectives	Burgersfort
Jacana Environmental CC	Donkerhoek Dam development	Full ecological assessment (Fauna, floral, wetland and aquatic assessment) as part of the EIA process	Mpumalanga
EXM Advisory Services	Evander Gold Mining (Pty) Ltd	Determination of the Wetland Offset Requirements for the proposed expansion of the Elikhulu Tailings Storage Facility	Mpumalanga
EXM Advisory Services	Canyon Coal - Witfontein mining project	Delineate and characterize the wetland and aquatic resources for the Witfontein mining project located by the farms Holfontein and Witrand near Bethal	Mpumalanga
SRK Consulting (South Africa) (PTY) Ltd	The Sierra Rutile Mine	Specialist terrestrial ecology, aquatic ecology and wetland ecology studies	Moyamba District - Sierra Leona
<b>INFRASTRUCTURE</b>			
GIBB (Pty) Ltd	Bronkhorstspuit Feeder Line	Monthly Aquatic Biomonitoring as part of the environmental assessment and authorization process for the proposed conversion of the Bronkhorstspuit plots feeder from 6.6kv to 22kv	Bronkhorstspuit
SRK Consulting (PTY) Ltd	South Dunes Precinct Project	Full Ecological Assessment	Richards Bay
SRK Consulting (PTY) Ltd	Braamfonteinspruit Rehabilitation	Terrestrial, Freshwater and Aquatic Ecological Assessment as part of the rehabilitation and management plan for the Braamfonteinspruit, Johannesburg	Johannesburg
Iliso Consulting (Pty) Ltd	City of Johannesburg	Aquatic Ecological Assessment, monitoring and managing the ecological state of rivers in the City Of Johannesburg Metropolitan area	Johannesburg
Maanakana Projects and Consulting (Pty) Ltd	Lethabo Pump Station	Aquatic present ecological state assessment of the Vaal river	Vereeniging
SRK Consulting	CTIA runway re-alignment project – Wetland Offset	Determination of the Wetland offset requirements for Cape Town international Airport runway realignment, identification of a suitable offset location and compilation of relevant baseline assessments (Wetland and faunal), Khayelitsha. (2017)	Cape Town
GIBB (Pty) Ltd	Musami Dam	Determination of the draft environmental water quality requirements for the project	Zimbabwe
Nemai Consulting (PTY) Ltd	uMkhomazi Water Project	Determination of the Wetland and Terrestrial Biodiversity Offset Requirements for the proposed uMkhomazi Water Project	Richmond - KZN
<b>POWER GENERATION</b>			
Iliso Consulting	Mzimvubu Dam	Full Terrestrial (Flora and Faunal), Wetland and Aquatic Baseline Ecological Assessment	Eastern Cape
WKN-Wind current SA C/O Alan Wolfromm	HGA HAGA WEF	Hydrological Assessment	Eastern Cape
SRK Consulting (PTY) Ltd	RPM Crossing	Wetland Delineation	Free State
SRK Consulting (Pty) Ltd	Eskom Denova Powerline and sub-station	Freshwater assessment as part of the EIA process for the proposed Eskom powerline (1, 75 km in length) and sub-station (132kV) near Denova, Western Cape. (2014)	Western Cape
CSIR Consulting & Analytical Services	Sutherland WEF	Freshwater Ecological Assessments	Northern Cape
CSIR Consulting & Analytical Services	Victoria West WEF	Freshwater Ecological Assessments	Northern Cape





## SCIENTIFIC AQUATIC SERVICES (SAS) – SPECIALIST CONSULTANT INFORMATION

### CURRICULUM VITAE OF **CHRISTEL DU PREEZ**

#### PERSONAL DETAILS

Position in Company	Junior Wetland Ecologist
Date of Birth	22 March 1990
Nationality	South African
Languages	English, Afrikaans
Joined SAS	January 2016

#### EDUCATION

##### Qualifications

MSc Environmental Sciences (North West University)	2017
BSc (Hons) Environmental Sciences (North West University)	2012
BSc Environmental and Biological Sciences (North West University)	2011

#### COUNTRIES OF WORK EXPERIENCE

South Africa – KwaZulu Natal, Northern Cape, Gauteng, Mpumalanga, Free State, Eastern Cape

#### SELECTED PROJECT EXAMPLES

##### Wetland Assessments

- Baseline freshwater assessment as part of the environmental assessment and authorisation process for the proposed National Route 3 (N3) Van Reenen Village Caltex Interchange, KwaZulu Natal.
- Basic assessment for the proposed construction of supporting electrical infrastructure for the Victoria West Wind Farm, Victoria West, Northern Cape Province.
- Freshwater Ecological Assessment in Support of the WULA Associated with the Rehabilitation of the Wetland Resources in Ecopark, Centurion, and Gauteng.
- Wetland Ecological Assessment for the Proposed Mixed Land Use Development (Kosmosdal Extension 92) on the remainder of Portion 2 of the farm Olievenhoutbosch 389 Jr, City of Tshwane Metropolitan Municipality, Gauteng Province.
- Freshwater Ecological Assessment for the Mokate Pig Production and Chicken Broiler Facility on the farm Rietvalei Portion 1 and 6 near Delmas, Mpumalanga.
- Wetland Ecological Assessment as part of the Environmental Assessment and Authorisation Process for the Proposed Relocation of a Dragline from the Kromdraai Section to Navigation Section of the Anglo American Landau Colliery in Mpumalanga.
- Freshwater Assessment as part of the Environmental Assessment and Authorisation Process for a proposed 132kv powerline and associated infrastructure for the proposed Kalkaar Solar Thermal Power Plant near Kimberley, Free State and Northern Cape Provinces.
- Freshwater Ecological Assessment of the Freshwater Prospect Stream in the AEL Operational Area, Modderfontein, Gauteng.



- 
- Specialist Freshwater Scoping and Environmental Impact Assessment for the Proposed Development of the Platberg and Teekloof Wind Energy Facility and Supporting Electrical Infrastructure near Victoria West, Northern Cape Province.
  - Wetland Ecological Assessment as part of the Environmental Assessment and Authorisation Process for the Proposed Development of Wilgedraai, Vaaldam Settlement 1777, Free State Province.
  - Freshwater Resource Delineation and Assessment as part of the consolidation of four Environmental Management Plans at the Grasper Colliery, in Middelburg, Mpumalanga Province.
  - Freshwater Assessment as part of the Water Use Authorisation for the proposed Copperton Wind Energy Facility, Northern Cape.
  - Freshwater Resource and Water Quality Ecological Assessment for the Lakefield Manor Residential project, Boksburg, Gauteng Province.



**1. (b) a declaration that the specialist is independent in a form as may be specified by the competent authority**

I, Stephen van Staden, declare that -

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct



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Signature of the Specialist





**TERRESTRIAL ECOLOGICAL SCAN INVESTIGATION AS  
PART OF THE ENVIRONMENTAL AUTHORISATION  
PROCESS FOR THE PROPOSED MASHIMONG PARK  
DEVELOPMENT WITHIN TEMBISA, GAUTENG PROVINCE**

**Prepared for**

**Information Decision Systems**

**July 2018**

**Prepared by:** Scientific Aquatic Services  
**Report author:** M. Meintjies  
**Report reviewer:** C. Hooton  
N. Cloete (Pr. Sci. Nat)  
**Report Reference:** SAS 218018  
**Date:** July 2018

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## EXECUTIVE SUMMARY

During the field assessment two habitat units, namely the watercourse and transformed habitat units were identified within Mashimong Park. It was evident at the time of the assessment that Mashimong Park has been subjected to high levels of anthropogenic activities which has resulted in severe alteration of the park and watercourse as well as the formalisation of the northern portion of the watercourse. As such the majority of the park including the watercourse has been transformed to cultivated lawn by the species *Pennisetum clandestinum* (Kikuyu) as well as alien invasive species proliferation. At the time of assessment various anthropogenic related impacts were observed within the park, which include the disposal of household waste and construction rubble, informal brick production, *Brassica oleracea var. capitata* (Cabbage) cultivation, as well as an existing kraal and recycling area. As such the floral and faunal ecology of Mashimong Park is considered to be of low ecological importance and sensitivity. Furthermore, no floral or faunal SCC were observed at the time of assessment, nor are any likely to occur within the area as the park is situated within a high density urban area with high levels of anthropogenic activities.

Based on the impact assessment, the impacts on floral and faunal habitat, diversity and SCC varies from low to very low significance during the construction and operational phase of the project prior to mitigation taking place. With effective mitigation implemented, all impacts may be reduced to very low levels during all phases of the project.

Based on the findings of the assessment, it is the opinion of the ecologists that this study provides the relevant information required in order to implement Integrated Environmental Management (IEM) and to ensure that the best long-term use of the ecological resources in the area will be made in support of the principle of sustainable development. It is the opinion of the ecologist that provided all mitigation measures are adhered to and implemented, the construction of the proposed upgrade of Mashimong Park is unlikely to have a significant long-term impact on the terrestrial ecology of the area, and can potentially result in an increase of floral and faunal diversity should indigenous species be utilised within the landscaping of the project.



## MANAGEMENT SUMMARY

Scientific Aquatic Services (SAS) was appointed to conduct a terrestrial ecological sensitivity scan as part of the Environmental Impact Assessment (EIA) and Authorisation Process for the proposed upgrade of the Mashimong Park within Tembisa, Gauteng Province by the City of Ekurhuleni Metropolitan Municipality. Mashimong Park is situated within the suburb of Mashimong and is bordered by the suburb of Moriting to the east, Sedibeng to the south and Makulong to the north. The western boundary of Mashimong park is bordered by Lapetus Street, Polaris Crescent, and Mimas Street, while Freedom street and Reverent R.T.J. Namane Drive borders the park to the east and north respectively. Furthermore the R21 is situated approximately 1 km to the east.

### **Specific outcomes required from this report include the following:**

- To define the Present Ecological State (PES) of the terrestrial ecological resources associated with Mashimong Park;
- To conduct a Species of Conservation Concern (SCC) assessment, including potential for such species to occur or to have occurred within Mashimong Park
- To identify and consider all sensitive landscapes including rocky ridges, wetlands and any other ecologically important features, if present; within Mashimong Park; and
- To determine the ecological impacts that the construction and operational activities might have on the terrestrial ecology associated with the proposed upgrade of Mashimong Park and to develop mitigation and management measures for all phases of the project.

### **Results of the Desktop Analysis**

- According to Mucina and Rutherford (2012) Mashimong Park is situated within the Carletonville Dolomite Grassland (Vulnerable). However, during the field assessment, it was evident that Mashimong Park is no longer representative of this vegetation type as a result of alien floral species proliferation;
- The Gauteng C-Plan indicate a non-perennial river system traversing the central portion of Mashimong Park in a northerly direction. This river feature is furthermore also considered to be an Ecological Support Area (ESA) according to the database.

### **Terrestrial Results**

- Two habitat units, namely the watercourse and transformed habitat units were identified within Mashimong Park during the field assessment;
- The watercourse traversed Mashimong Park in a northerly direction and was associated with high levels of anthropogenic activities which has resulted in severe alteration of the system, particularly erosion of the banks and formalisation of the northern portion of the watercourse. High levels of disposed household waste were also encountered within the watercourse. Although some obligate<sup>1</sup> and facultative<sup>2</sup> wetland species such as *Typha capensis*, and *Cyperes eragrostis* was encountered, the majority of the watercourse comprised of alien invasive species such as *Pennisetum clandestinum*, and *Ricinus communis* var. *communis*;
- The transformed habitat comprised predominantly of cultivated lawns by the species *P. clandestinum* (Kikuyu grass) and was associated with a variety of anthropogenic activities such as an existing park with a playground and braai facilities in the northern portion, a kraal with livestock, recycling area, cultivated *Brassica oleracea* var. *capitata* (Cabbage) patch, several informal brick production merchants, as well as disposal of construction rubble within the southern portion;
- The vegetation associated with Mashimong Park comprised predominantly of alien invasive species and species associated with high levels of disturbance such as *Datura stramonium*, *Amaranthus hybridus* subsp. *hybridus*, *Argemone Mexicana*, *Persicaria lapathifolia* and *Solanum mauritianum*. Few faunal species were observed at the time of assessment which can be attributed to the severely degraded state of Mashimong Park as well as the season of assessment. As such only common faunal species adapted to urbanised areas, such as

<sup>1</sup> Species almost always found in wetlands (>99% of occurrences).

<sup>2</sup> Species usually found in wetlands (76%-99% of occurrences) but occasionally found in non-wetland areas



*Streptopelia capicola* (Cape turtle-dove), *Larus cirrocephalus* (Grey-headed Gull), and *Rattus rattus* (Common black rat) were observed;

- Mashimong Park is therefore considered to be severely degraded and provide limited habitat for floral and faunal species. As such the floral and faunal ecology of the Park is considered to be of low ecological importance and sensitivity;
- Furthermore, no floral or faunal SCC were observed at the time of assessment, nor are any likely to occur within the area as the park is situated within a high density urban area and subjected to ongoing anthropogenic activities.

### **Terrestrial Impact Assessment:**

Based on the terrestrial impact assessment of potential impacts on floral and faunal habitat, diversity and SCC within Mashimong Park, it is evident that the impact on floral and faunal, habitat and diversity is of low significance, while the impact on floral and faunal SCC is very low prior to the implementation of mitigation measures for both the construction and operational phase. With mitigation measures fully implemented all impacts can be reduced to very low significance for all phases of the project.

**Table A: A summary of the construction impact significance on the Watercourse habitat**

<b>Impact</b>	<b>Unmanaged</b>	<b>Managed</b>
1: Impact on habitat for floral species habitat and diversity	Low	Very Low
2: Impact on habitat for faunal species habitat and diversity	Low	Very Low
3: Impact on Floral SCC	Very Low	Very Low
4: Impact on Faunal SCC	Very Low	Very Low

**Table B: A summary of the construction impact significance on the transformed habitat**

<b>Impact</b>	<b>Unmanaged</b>	<b>Managed</b>
1: Impact on habitat for floral species habitat and diversity	Low	Very Low
2: Impact on habitat for faunal species habitat and diversity	Low	Very Low
3: Impact on Floral SCC	Very Low	Very Low
4: Impact on Faunal SCC	Very Low	Very Low

**Table C: A summary of the operational impact significance on the watercourse habitat**

<b>Impact</b>	<b>Unmanaged</b>	<b>Managed</b>
1: Impact on habitat for floral species habitat and diversity	Low	Very Low
2: Impact on habitat for faunal species habitat and diversity	Low	Very Low
3: Impact on Floral SCC	Very Low	Very Low
4: Impact on Faunal SCC	Very Low	Very Low

**Table D: A summary of the operational impact significance on the transformed habitat**

<b>Impact</b>	<b>Unmanaged</b>	<b>Managed</b>
1: Impact on habitat for floral species habitat and diversity	Low	Very Low
2: Impact on habitat for faunal species habitat and diversity	Low	Very Low
3: Impact on Floral SCC	Very Low	Very Low
4: Impact on Faunal SCC	Very Low	Very Low

### **Sensitivity**

From a terrestrial ecological perspective, both the transformed and watercourse habitat units are considered to be low sensitivity, due to historic and ongoing anthropogenic activities. As such the development is unlikely to have a significant impact on the terrestrial floral or faunal ecology of the area. It is however advised that all bare areas outside of the watercourse utilised as lawns be seeded/ planted with *Dactyloctenium australe* (LM Grass) as opposed to *Pennisetum clandestinum*. Areas within the watercourse that will be landscaped or were the banks will be reprofiled and stabilised, should make use of indigenous grass species such as the Mayford Biomosone Grassveld Reclamation Mixture as well as indigenous sedge species. Should a larger diversity of indigenous floral species be introduced through the landscaping of the project, it may result in a positive impact by increasing the floral diversity and subsequently habitat and food availability for faunal species within the park.



**Table E: A summary of sensitivity of each habitat unit and implications for the proposed upgrade**

Habitat Unit	Sensitivity	Conservation Objective	Development Implications
Watercourse	Low	Optimise development potential.	The watercourse situated within Mashimong Park has been severely altered with the northern portion formalised and is associated with high levels of anthropogenic activities. The watercourse is dominated by the lawn grass <i>Pennisetum clandestinum</i> and other alien invasive plant species. As no floral or faunal SCC were observed within the watercourse, nor is it likely that any will utilise this section of the watercourse, the sensitivity from a terrestrial perspective is considered to be low. Development of the proposed footbridges across the watercourse can commence, however effort should be made not to undertake any construction and operational activities outside of the demarcated development footprint to limit edge effects. Areas within the watercourse that will be landscaped or where the banks will be re-established and profiled, should make use of indigenous grass and sedge species.
Transformed	Low	Optimise development potential.	This habitat unit has predominantly been transformed to cultivated lawns with high levels of anthropogenic related activities, including but not limited to illegal disposal of construction rubble, and informal brick production. As such from a floral perspective this habitat unit comprises of predominantly alien invasive species, with limited habitat and food availability for faunal species. The terrestrial ecological sensitivity is considered to be low. It is however advised that all bare areas outside of the watercourse that will be utilised as lawns should be seeded/ planted with <i>Dactyloctenium australe</i> (LM Grass) as opposed to <i>Pennisetum clandestinum</i> .





## DOCUMENT GUIDE

No.	Requirement	Section in report
a)	Details of -	
(i)	The specialist who prepared the report	Appendix I
(ii)	The expertise of that specialist to compile a specialist report including a curriculum vitae	Appendix I
b)	A declaration that the specialist is independent	Appendix I
c)	An indication of the scope of, and the purpose for which, the report was prepared	Section 1.2
cA)	An indication of the quality and age of base data used for the specialist report	Section 2.1 and 3.1
cB)	A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change	Section 6
d)	The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 1.3 and 2.1
e)	A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Appendix B and C
f)	Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives	Section 5
g)	An identification of any areas to be avoided, including buffers	Section 5
h)	A map superimposing the activity including the associated structure and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers	Section 5
i)	A description of any assumption made and any uncertainties or gaps in knowledge	Section 1.3
j)	A description the findings and potential implication\ of such findings on the impact of the proposed activity, including identified alternatives on the environment or activities	Section 4,5 and 6.
k)	Any mitigation measures for inclusion in the EMPr	Section 6.4
l)	Any conditions for inclusion in the environmental authorisation	Section 6.4
m)	Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 6.4
n)	A reasoned opinion -	
(i)	As to whether the proposed activity, activities or portions thereof should be authorised	Section 7
(iA)	Regarding the acceptability of the proposed activity or activities	Section 7
(ii)	If the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 6.4
o)	A description of any consultation process that was undertaken during the course of preparing the specialist report	N/A
p)	A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	N/A
q)	Any other information requested by the competent authority	N/A



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## GLOSSARY OF TERMS

<b>Alien vegetation</b>	Plants that do not occur naturally within the area but have been introduced either intentionally or unintentionally. Vegetation species that originate from outside of the borders of the biome -usually international in origin.
<b>Biome</b>	A broad ecological unit representing major life zones of large natural areas – defined mainly by vegetation structure and climate.
<b>CBA (Critical Biodiversity Area)</b>	A CBA is an area considered important for the survival of threatened species and includes valuable ecosystems such as wetlands, untransformed vegetation and ridges.
<b>ESA (Ecological Support Area)</b>	An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation.
<b>IBA (Important Bird and Biodiversity Area)</b>	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 or sites that have significant populations.
<b>Indigenous vegetation</b>	As defined within the NEMA EIA Regulations Listing Notice 1 and 3 of 2014 (amended 2017) “indigenous vegetation” refers to 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. Vegetation occurring naturally within a defined area.
<b>RDL (Red Data listed) species</b>	Organisms that fall into the Extinct in the Wild (EW), critically endangered (CR), Endangered (EN), Vulnerable (VU) categories of ecological status.
<b>SCC (Species of Conservation Concern)</b>	The term SCC in the context of this report refers to all RDL (Red Data) and IUCN (International Union for the Conservation of Nature) listed threatened species as well as protected species of relevance to the project.



## LIST OF ACRONYMS AND ABBREVIATIONS

<b>BGIS</b>	Biodiversity Geographic Information Systems
<b>CARA</b>	Conservation of Agricultural Resources Act
<b>CBA</b>	Critical Biodiversity Area
<b>CR</b>	Critically Endangered
<b>EAP</b>	Environmental Assessment Practitioner
<b>EIA</b>	Environmental Impact Assessment
<b>EN</b>	Endangered
<b>ESA</b>	Ecological Support Areas
<b>EW</b>	Extinct in the Wild
<b>GDARD</b>	Gauteng Department of Agriculture and Rural Development
<b>GIS</b>	Geographic Information System
<b>GPS</b>	Global Positioning System
<b>IBA</b>	Important Bird Area
<b>IUCN</b>	International Union for the Conservation of Nature
<b>NBA</b>	National Biodiversity Assessment (2011)
<b>NEMA</b>	National Environmental Management Act (Act 107 of 1998)
<b>NEMBA</b>	National Environmental Management: Biodiversity Act (Act 10 of 2004)
<b>NT</b>	Near Threatened
<b>PES</b>	Present Ecological State
<b>POC</b>	Probability of Occurrence
<b>PRECIS</b>	Pretoria Computer Information Systems
<b>QDS</b>	Quarter Degree Square (1:50,000 topographical mapping references)
<b>RDL</b>	Red Data List
<b>RE</b>	Regionally Extinct
<b>SABAP 2</b>	Southern African Bird Atlas 2
<b>SANBI</b>	South African National Biodiversity Institute
<b>SAPAD</b>	South African Protected Areas Database
<b>SCC</b>	Species of Conservation Concern
<b>SAS</b>	Scientific Aquatic Services CC
<b>TSP</b>	Threatened Species Programme
<b>VU</b>	Vulnerable





# 1. INTRODUCTION

## 1.2 Background

Scientific Aquatic Services (SAS) was appointed to conduct a terrestrial ecological sensitivity scan as part of the Environmental Impact Assessment (EIA) and Authorisation Process for the proposed upgrade of the Mashimong Park within Tembisa, Gauteng Province by the City of Ekurhuleni Metropolitan Municipality.

Mashimong Park is situated within the suburb of Mashimong and is bordered by the suburb of Moriting to the east, Sedibeng to the south and Makulong to the north. The western boundary of Mashimong park is bordered by Lapetus Street, Polaris Crescent, and Mimas Street, while Freedom street and Reverent R.T.J. Namane Drive borders the park to the east and north respectively. Furthermore the R21 is situated approximately 1 km to the east. The locality of Mashimong Park is depicted in Figure 1 and 2.

The proposed development entails formalising of Mashimong Park into a recreational area, which includes (Figure 3):

- Playground and gym area;
- Picnic and braai areas;
- Ornamental garden;
- Event space;
- Caretakers house; and
- Two bridge crossings over the watercourse.

This report, after consideration and the description of the ecological integrity of Mashimong Park, must guide the Environmental Assessment Practitioner (EAP), regulatory authorities and developing proponent, by means of the presentation of results and recommendations, as to the ecological viability of the proposed infrastructure upgrade activities.



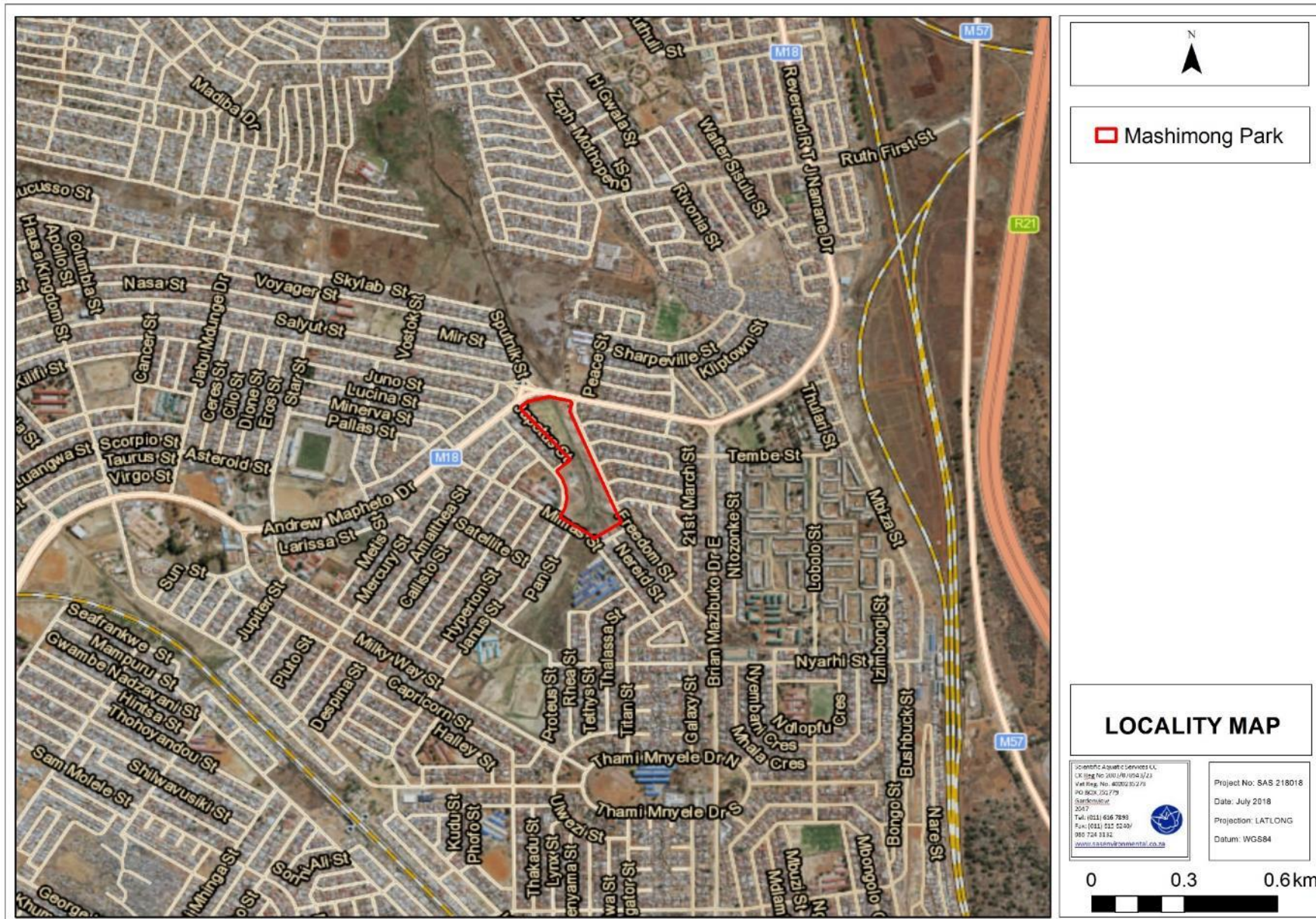


Figure 1: Digital satellite image depicting the location of Mashimong Park in relation to the surrounding areas.





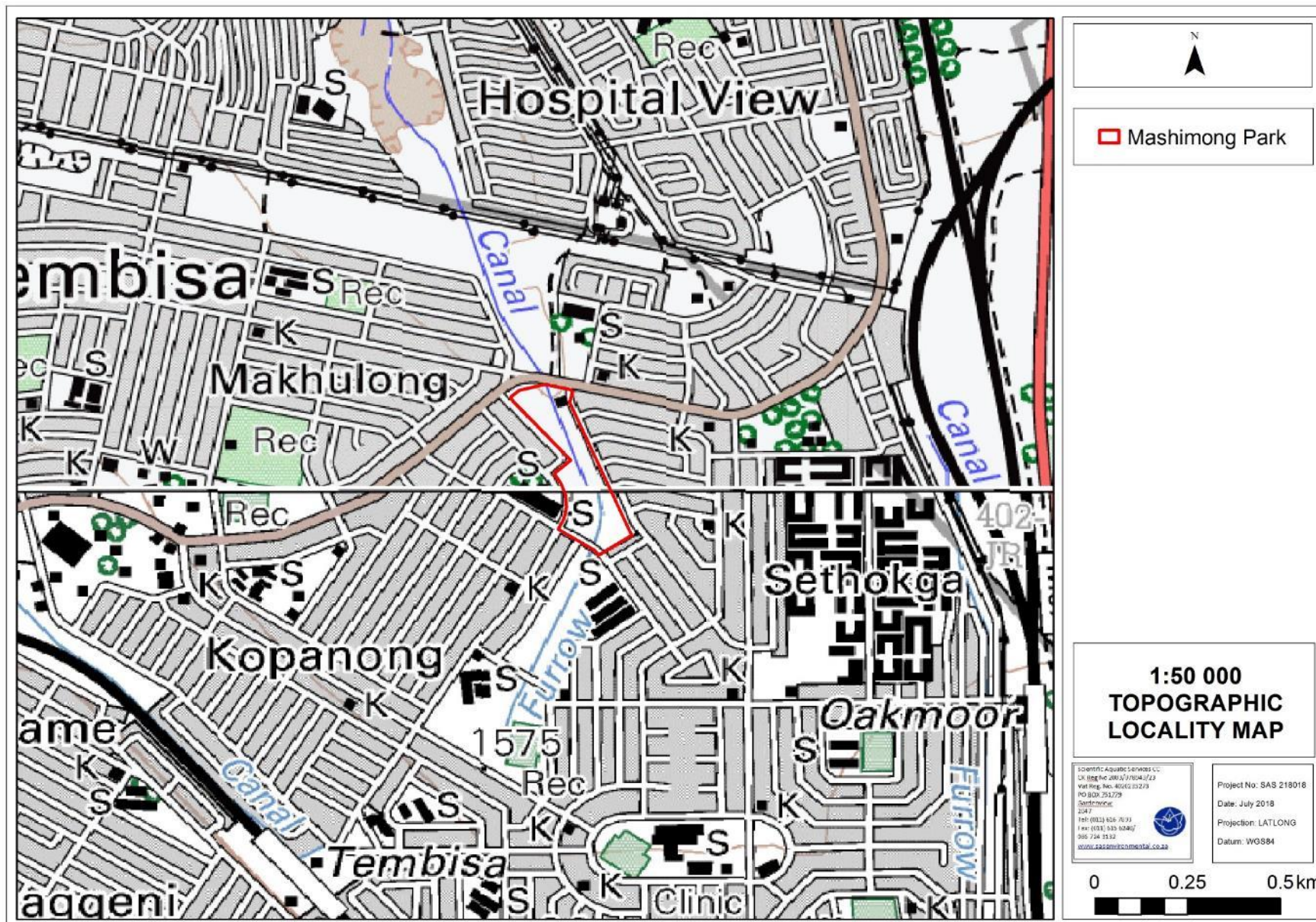


Figure 2: Mashimong Park depicted on a 1:50 000 topographical map in relation to the surrounding area.







Figure 3: Proposed activities associated with the formalisation of the recreational area of Mashimong Park (Outer Space Landscape Architects, 2018).



## **1.2 Project Scope**

Specific outcomes in terms of this report are outlined below:

- To define the Present Ecological State (PES) of the terrestrial ecological resources associated with Mashimong Park;
- To conduct a Species of Conservation Concern (SCC) assessment, including potential for such species to occur or to have occurred within Mashimong Park;
- To identify and consider all sensitive landscapes including rocky ridges, wetlands and any other ecologically important features, if present; within Mashimong Park; and
- To determine the ecological impacts that the construction and operational activities might have on the terrestrial ecology associated with the proposed upgrade of Mashimong Park and to develop mitigation and management measures for all phases of the project.

## **1.3 Assumptions and Limitations**

The following assumptions and limitations are applicable to this report:

- The terrestrial ecological scan was confined to Mashimong Park, and does not include the neighbouring and adjacent properties; these were however considered as part of the desktop assessment;
- With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked due to the time of the assessment, and many forb and grass species might have died back. It is, however, expected that most floral and faunal communities have been accurately assessed and considered;
- Due to the nature and habits of most faunal taxa and the high level of surrounding anthropogenic activities, it is unlikely that all species would have been observed during a site assessment of limited duration. Therefore, site observations were compared with literature studies where necessary; and
- The data presented in this report is based on a single site assessment undertaken on the 2<sup>nd</sup> of July 2018 (winter). Although some grass species were hard to identify due to winter die back, and limited inflorescences being present, the majority of the species could be identified, as the area has been transformed to cultivated lawns and comprised predominantly of alien invasive species. On-site data was significantly augmented with all available desktop data. Due to the present transformed ecological state of Mashimong Park, the findings of this assessment are however considered to be a true reflection of the ecological characteristics of the Park.





## **1.4 Legislative requirements and Provincial Guidelines**

The following legislative requirements were considered during the assessment:

- National Environmental Management Act, 1998, (Act 107 of 1998) (NEMA);
- National Environmental Management: Biodiversity Act, 2004, (Act 10 of 2004) (NEMBA);
- Conservation of Agricultural Resources Act, 1983, (Act 43 of 1983) (CARA); and
- Gauteng Department of Agriculture and Rural Development (GDARD) Minimum Requirements for Biodiversity Assessments (2014).

The details of each of the above, as they pertain to this study, are provided in Appendix A of this report.

## **2. ASSESSMENT APPROACH**

### **2.1 General Approach**

In order to accurately determine the PES of Mashimong Park and capture comprehensive data with respect to the terrestrial ecology, the following methodology was used:

- Maps and digital satellite images were consulted prior to the field assessment in order to determine broad habitats, vegetation types and potentially sensitive sites. The results of this analysis were then used to focus the field work on specific areas of concern and to identify areas where target specific investigations were required;
- A literature review with respect to habitats, vegetation types and species distribution was conducted;
- Relevant databases considered during the assessment of Mashimong Park included, but were not necessarily limited to, the South African National Biodiversity Institute (SANBI) Threatened Species Programme (TSP), the Gauteng Conservation Plan version 3.3 (C-Plan V3.3, 2011), Mucina and Rutherford (2012), National Biodiversity Assessment (2011), Important Bird Areas in conjunction with the South African Bird Atlas Project (SABAP 1 and 2), International Union for the Conservation of Nature (IUCN), and Pretoria National Herbarium Computer Information Systems (PRECIS);
- A single site assessment was undertaken on the 2<sup>nd</sup> of July 2018 in order to confirm the validity of data and background information obtained during consultation of the maps and to determine the ecological status of Mashimong Park. A thorough walk



through” on foot was undertaken in order to identify the occurrence of the dominant floral species and habitat diversities for faunal communities;

- Specific methodologies for the assessment, in terms of field work and data analysis of faunal and floral ecological assemblages will be presented in Appendices B and C; and
- For the methodologies relating to the impact assessment and development of the mitigation measures, please refer to Appendix D of this report.

## ***2.2 Sensitivity Mapping***

All the ecological features associated with Mashimong Park was considered and sensitive areas were delineated with the use of a Global Positioning System (GPS). In addition, if any SCC and SANBI protected species were observed, their position was also marked by means of GPS. A Geographic Information System (GIS) was used to project these features onto satellite imagery.

# **3. RESULTS OF THE DESKTOP ANALYSIS**

## ***3.1 Conservation Characteristics of Mashimong Park***

The following table contains data accessed as part of the desktop assessment. It is important to note that although all data sources used provide useful and often verifiable high-quality data, the various databases do not always provide an entirely accurate indication of Mashimong Park’s actual biodiversity characteristics, and as such require ground truthing.



**Table 1: Summary of the conservation characteristics for Mashimong Park.**

DETAILS OF THE STUDY AREA IN TERMS OF MUCINA & RUTHERFORD (2012)		CONSERVATION DETAILS PERTAINING TO THE STUDY AREA (VARIOUS DATABASES)	
<b>Biome</b>	According to Mucina and Rutherford (2012), Mashimong Park Application Area is located in the Grassland Biome.	<b>NBA (2011)</b>	Mashimong Park falls within an area that is currently poorly protected. Ecosystem types are categorised as not protected poorly protected, moderately protected and well protected based on the proportion of each ecosystem type that occurs within a protected area recognised in the National Environmental Management: Protected Areas Act, 2003 (Act 57 of 2003), and compared with the biodiversity target for that ecosystem type. Ecosystems where less than 50% of the biodiversity target has been met, is considered to be poorly protected.
<b>Bioregion</b>	Mashimong Park is situated within the Dry Highveld Grassland Bioregion.		
<b>Vegetation Type</b>	The vegetation type associated with Mashimong Park is the Carletonville Dolomite Grassland		
<b>Climate Information</b>	Warm-temperate, summer-rainfall region	<b>Threatened Ecosystems (2011)</b>	According to the National Threatened Ecosystem (2011) database, Mashimong Park does not fall within an endangered ecosystem type.
	<b>MAP* (mm)</b> 593		
	<b>MAT* (°C)</b> 16.1	<b>NPAES (2009) and SACAD (2018)</b>	According to the NPAES (2009) SACAD and SAPAD (2018) Datasets there are no protected or conservation areas situated within 5 km of Mashimong Park
	<b>MFD* (Days)</b> 37		
	<b>MAPE* (mm)</b> 2388		
<b>MASMS* (%)</b> 78	<b>IBA (2015)</b>	There are no IBAs indicated within 5 km of Mashimong Park	
<b>Altitude (m)</b>	1360–1620	<b>GAUTENG CONSERVATION PLAN (C-PLAN V3.3, 2011) - Figure 4</b>	
<b>Distribution</b>	North-West (mainly) and Gauteng and marginally into the Free State Province	<b>River and Wetland Buffer</b>	The Gauteng C-Plan indicate a non-perennial river buffer traversing Mashimong Park and the investigation area. A Wetland Buffer is situated approximately 400m north of Mashimong Park within the investigation area,
<b>Geology, Soils &amp; Hydrology</b>	The geology of the Carletonville Dolomite Grassland is dominated by Malmani Subgroup (Transvaal Supergroup) supporting mostly shallow Mispah and Glenrosa soil forms typical of the Fa land type. Deeper red and yellow apedal soils occur sporadically, representing the Ab land type	<b>Critical Biodiversity Area (CBA)</b>	There are no CBAs associated with Mashimong Park, however a CBA considered important for “Red” and “Orange” listed plant habitat, and for primary vegetation is situated approximately 25m to the north. A CBA is an area considered important for the survival of threatened species and includes valuable ecosystems such as wetlands, untransformed vegetation and ridges.
<b>Conservation</b>	Vulnerable. Target 24%. Small extent conserved in statutory	<b>Ecological Support Area (ESA)</b>	An ESA coinciding with the non-perennial river buffer traverses Mashimong Park. ESAs are defined by GDARD as natural, near-natural, degraded or heavily modified areas required to be maintained in an ecologically functional state to support CBAs and/or Protected Areas.
<b>Vegetation &amp; landscape features</b>	Slightly undulating plains dissected by prominent rocky chert ridges. Species-rich grasslands forming a complex mosaic pattern dominated by many species		

CBA = Critical Biodiversity Areas; ESA = Ecological Support Area; IBA = Important Bird and Biodiversity Areas; MAP – Mean annual precipitation; MAT – Mean annual temperature; MAPE – Mean annual potential evaporation; MFD = Mean Frost Days; MASMS – Mean annual soil moisture stress (% of days when evaporative demand was more than double the soil moisture supply); NBA = National Biodiversity Assessment; NPAES = National Protected Areas Expansion Strategy; SACAD = South African Conservation Areas Database; SAPAD = South African Protected Areas Database







Figure 4: River buffer and ESA associated with Mashimong Park as identified by the Gauteng Conservation Plan v3.3 (2011).



## 4. TERRESTRIAL ECOLOGICAL ASSESSMENT RESULTS

### 4.1 Terrestrial Habitat Units

During the field investigation it was evident that two habitat units were present within Mashimong Park, namely the transformed habitat and the watercourse habitat. The watercourse traversed Mashimong Park in a northerly direction and was associated with high levels of anthropogenic activities which has resulted in alteration of the watercourse, with formalisation of the northern portion, where severe erosion of the banks has resulted in exposure of the concrete canal. Although some obligate and facultative wetland species such as *Typha capensis*, and *Cyperes eragrostis* was encountered within the watercourse, the majority of the watercourse comprised of alien invasive species such as *Pennisetum clandestinum*, *Solanum mauritianum* and *Ricinus communis* var. *communis*. This habitat unit is also used as a disposal point for household waste. This habitat unit does provide suitable habitat for common avifaunal species adapted to urbanised areas, such as *Streptopelia capicola* (Cape turtle-dove), *Ploceus velatus* (Southern Masked-weaver) and *Larus cirrocephalus* (Grey-headed Gull). As such the ecological importance of this habitat unit in terms of floral and faunal importance is considered to be low.

The transformed habitat comprised predominantly of cultivated *Pennisetum clandestinum* (Kikuyu grass) lawns and was associated with a variety of anthropogenic activities such as an existing park with a playground and braai facilities, a kraal with various livestock, a recycling area, a cultivated *Brassica oleracea* var. *capitata* (Cabbage) patch and several informal brick production activities in the southern portion. The areas not associated with direct human activities were associated with high levels of illegal dumping of construction rubble. As such the area is considered to be severely degraded and provides limited habitat for floral and faunal species. As such the habitat unit is considered to be of low ecological importance and sensitivity from a floral and faunal perspective.







**Figure 5: Representative photographs of the various anthropogenic activities associated with Mashimong Park. Top Left: Dumping of house hold waste within the watercourse. Top Right: The northern portion currently utilized as a park with a play area and braai facilities. Bottom Left: Illegal disposal of constructing rubble within the southern portion of Mashimong Park. Bottom Right: Informal brick production within the southern portion of the Park.**



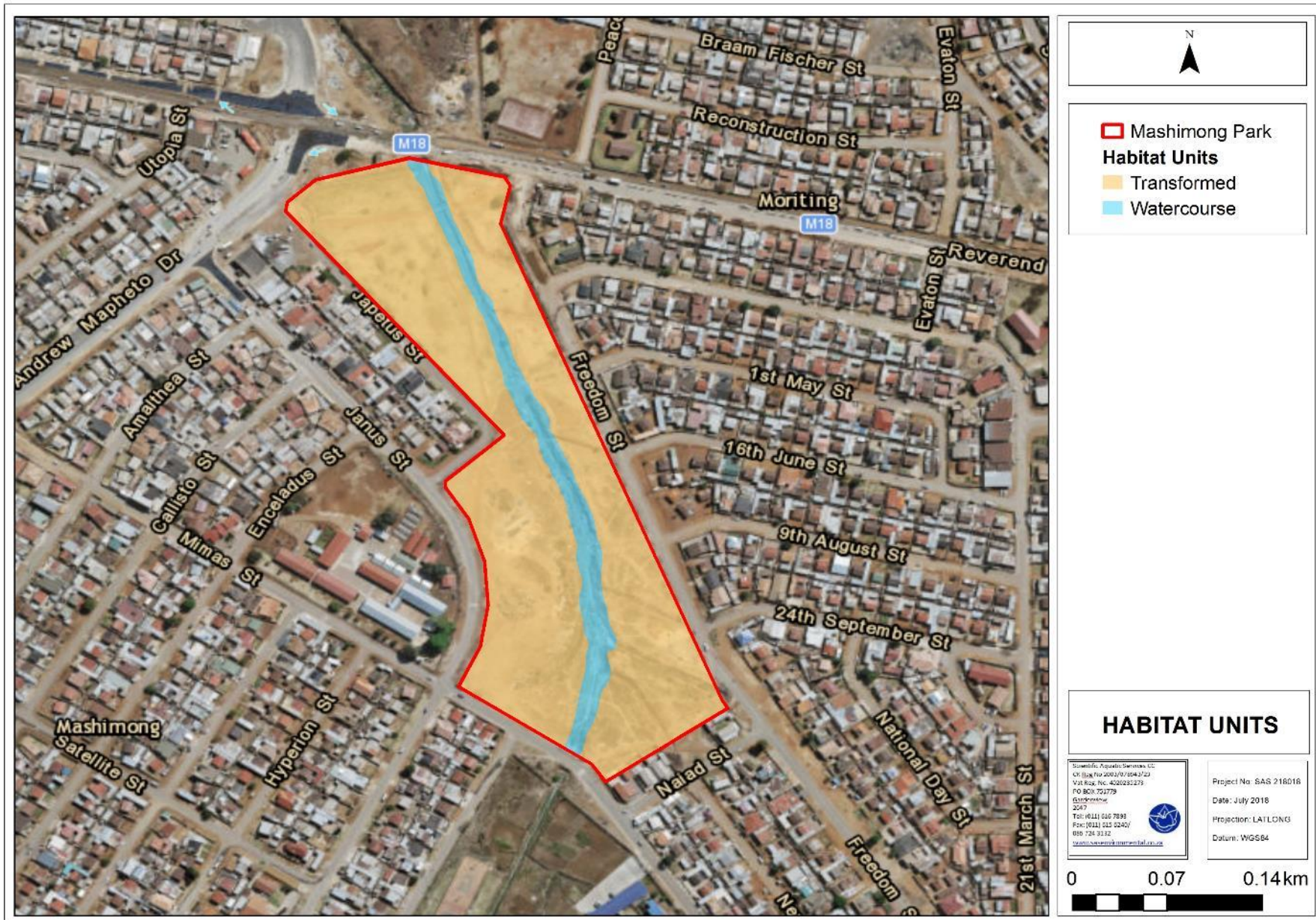



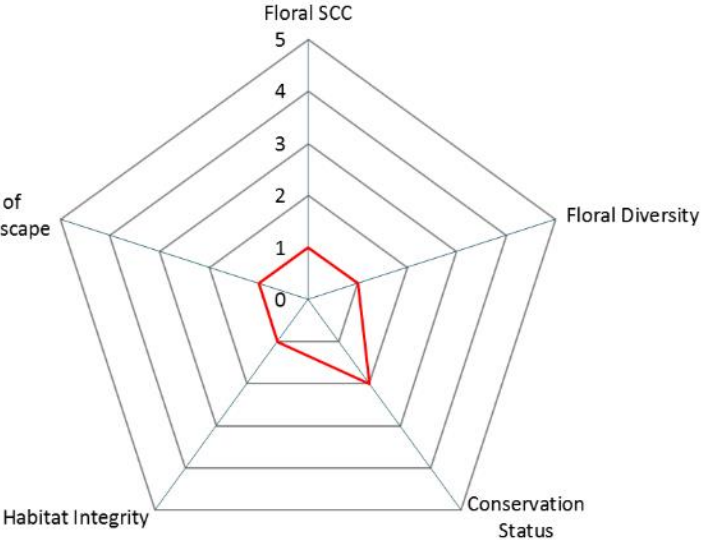

Figure 6: Habitat units encountered within the study area and associated service infrastructure.





## 4.2 Floral Assessment Results

Table 2: Summary of results of the Floral Assessment

<p><b>Habitat Units:</b>  <b>Watercourse:</b> Traversing the central portion of Mashimong Park in a northerly direction.  <b>Transformed:</b> The majority of Mashimong Park with the exception of the watercourse</p>	<table border="1"> <thead> <tr> <th>Floral Sensitivity</th> <th>Habitat</th> <th>Low</th> </tr> </thead> <tbody> <tr> <td colspan="3"> <p><b>Notes on Photograph:</b>                      It is evident from the photographs that Mashimong Park comprises predominantly of <i>Pennisetum clandestinum</i> (Kikuyu) lawns.  <b>Top:</b> Representative photographs of the Watercourse habitat unit; <b>Bottom</b> Representative photographs of the transformed habitat unit.</p> </td> </tr> </tbody> </table>	Floral Sensitivity	Habitat	Low	<p><b>Notes on Photograph:</b>                      It is evident from the photographs that Mashimong Park comprises predominantly of <i>Pennisetum clandestinum</i> (Kikuyu) lawns.  <b>Top:</b> Representative photographs of the Watercourse habitat unit; <b>Bottom</b> Representative photographs of the transformed habitat unit.</p>				
Floral Sensitivity	Habitat	Low							
<p><b>Notes on Photograph:</b>                      It is evident from the photographs that Mashimong Park comprises predominantly of <i>Pennisetum clandestinum</i> (Kikuyu) lawns.  <b>Top:</b> Representative photographs of the Watercourse habitat unit; <b>Bottom</b> Representative photographs of the transformed habitat unit.</p>									
<p><b>Floral Habitat Sensitivity Graph:</b></p> <p style="text-align: center;"><b>Floral Habitat Sensitivity</b></p> 									
<p><b>Floral Species of Conservation Concern (SCC)</b></p>	<p>During the field assessment no floral SCC were observed within Mashimong Park. It is furthermore highly unlikely that any such species will be present within Mashimong Park due to the high levels of anthropogenic activities associated with the park which has resulted in severe degradation and transformation of the floral species composition.</p>								




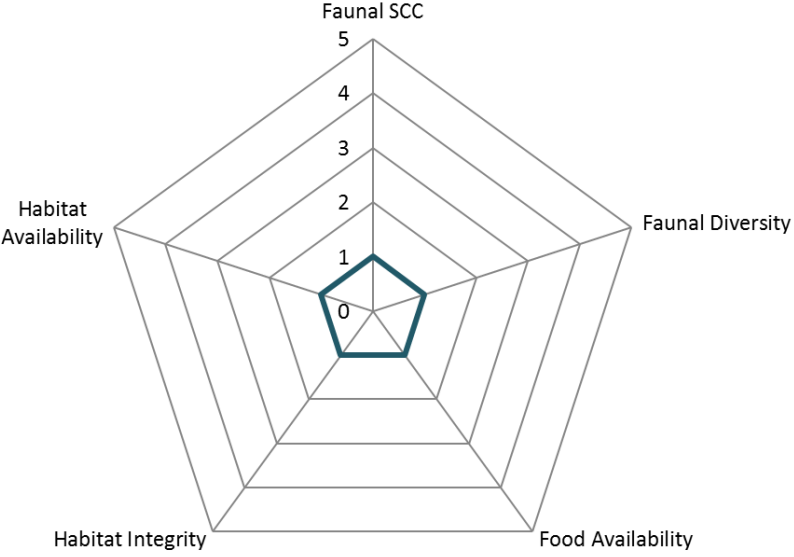
<b>Floral Diversity</b>	The floral diversity of Mashimong Park is considered to be low, as the area comprised predominantly of cultivated <i>Pennisetum clandestinum</i> lawns, which has extended into the watercourse habitat. This together with high levels of anthropogenic activities such as illegal disposal of construction material, crop cultivation and informal brick production has resulted in significant indigenous species loss and alien plant species proliferation. The area is furthermore situated within an urban setting, which limits the spread of indigenous floral species to the area, and an overall decrease in floral species diversity.		
<b>Conservation Status of Vegetation Type/Ecosystem</b>	The Gauteng Conservation Plan (2011) indicate the watercourse habitat of Mashimong Park to be an Ecological Support Area. During the field assessment it was however evident that the watercourse has been formalised, in the northern portion and the habitat of the system has been significantly degraded due to the setting of the feature within an urbanised area. This together with the ongoing anthropogenic related activities associated with the area, limits the ability of the watercourse situated within Mashimong Park to function as an ESA within the landscape. As such the conservation importance of Mashimong Park is considered to be moderately low.		
<b>Habitat integrity/Alien and Invasive species</b>	Mashimong Park comprised predominantly of alien invasive species such as <i>Pennisetum clandestinum</i> , <i>Amaranthus hybridus</i> subsp. <i>hybridus</i> , <i>Argemone mexicana</i> , <i>Solanum mauritianum</i> and <i>Ricinus communis</i> var. <i>communis</i> . Furthermore, no species indigenous to the Carletonville dolomite grassland vegetation type were encountered during the field assessment and as such the habitat integrity of Mashimong Park is considered to be low.	<b>General comments:</b> The site assessment was undertaken during the winter season, with some floral species not in bloom. The high levels of anthropogenic activities and alien invasive species proliferation associated with the park indicate that although floral species might have been missed during the assessment, these species will be limited to common floral species. As such the floral ecology is considered to be of low ecological importance and sensitivity.	<b>Business Case, Conclusion and Mitigation Requirements:</b> Due to the transformed nature of Mashimong Park and the watercourse, as well as the area situated within a highly urbanised area, which are traversed by roads, the ability of the watercourse to function as an ESA in the landscape is limited. As such the anticipated impact of the proposed upgrade of the park on the floral ecology is low. As such there are no development constraints from a floral perspective. It is however recommended that a qualified landscape architect be consulted as to the landscaping of the project, particularly within the watercourse area, to ensure only indigenous species are utilised. Should a larger diversity of indigenous species be introduced through the landscaping of the project, it can result in a positive impact by increasing the floral diversity of the park. Furthermore, alien invasive species should be removed during the construction phase, with ongoing control during the operation of the park. An alien invasive monitoring and control plan should be implemented as part of the Environmental Management Programme (EMPR) to prevent regrowth and further spread of such species. Although <i>Pennisetum clandestinum</i> is considered to be a Category 1b invasive species as per NEMA alien invasive species list (2016) within protected areas and wetlands where it does not already exist, existing lawns do not have to be removed during alien invasive control. It is however advised that all bare areas outside of the watercourse that will be utilised as lawns should be seeded/ planted with <i>Dactyloctenium australe</i> (LM Grass) as opposed to <i>Pennisetum clandestinum</i> . Areas within the watercourse that will be landscaped or were the banks will be reprofiled and stabilised, should make use of indigenous grass species such as such as the Mayford Biomosone Grassveld Reclamation Mixture as well as indigenous sedge species.
<b>Presence of Unique Landscapes</b>	Although some obligate and facultative wetland species such as <i>Typha capensis</i> and <i>Cyperus eragrostis</i> , were observed within the watercourse, overall the habitat unit is not considered a unique landscape due to the significant transformation of the floral species diversity, thereby limiting the potential of the watercourse to provide suitable habitat for floral species of conservation concern.		





### 4.3 Faunal Assessment Results

Table 3: Summary of results of the faunal assessment

<p><b>Faunal Class:</b></p> <p>All classes</p>	<p><b>Faunal Habitat Sensitivity</b> <b>Low</b></p>	<p><b>Photograph:</b></p> 
<p><b>Notes on Photograph: Top Left:</b> An individual of the species <i>Larus cirrocephalus</i> (Grey-headed Gull) observed within Mashimong Park during the field assessment.</p>		
<p><b>Faunal Sensitivity Graph:</b></p> 		
<p><b>Faunal SCC/Endemics/TOPS/</b></p>	<p>No Faunal SCC were encountered during the field assessment, and the probability of any such species utilising Mashimong Park is highly unlikely due to the high level of habitat transformation that has taken place, the low level of vegetation covers as well as the parks location within a high density urban area.</p>	
<p><b>Faunal Diversity</b></p>	<p>The faunal diversity associated with Mashimong Park is considered to be low and comprised mainly of common faunal species adapted to urban areas. Species encountered during the field assessment included faunal species such as <i>Rattus rattus</i> (Common Black Rat), <i>Streptopelia capicola</i> (Cape turtle-dove), <i>Streptopelia senegalensis</i> (Laughing dove), <i>Bostrychia hagedash</i> (Hadeda Ibis), and <i>Ploceus velatus</i> (Southern Masked-weaver).</p>	



<b>Food Availability</b>	Food availability within Mashimong Park is limited as the majority of the area comprise of a single species namely <i>Pennisetum clandestinum</i> . The high levels of anthropogenic activities in the study area has furthermore resulted in floral alien species proliferation. As such natural food resources within Mashimong Park are low, although the disposed household food waste associated with the area does provide some additional food resources for species, such <i>Rattus rattus</i> (common black rat) and <i>Larus cirrocephalus</i> (Grey-headed Gull).	<b>General comments (dominant faunal species/noteworthy records etc.):</b> The assessment was undertaken during the winter season, and as such there were decreased food resources which would generally attract faunal species. As such, during the site assessment a limited diversity of faunal species was observed. Although limited faunal species were observed the transformed nature and associated anthropogenic activities associated with Mashimong Park are expected to limit faunal species diversity even in the summer months., As such the season during which the assessment was undertaken is not considered a fatal law as to faunal ecological assessment.	<b>Business Case, Conclusion and Mitigation Requirements:</b> The proposed upgrade of Mashimong Park is unlikely to have a significant impact on faunal species currently inhabiting the park and surrounding area. As such there are no conservation constraints applicable to the project from a faunal perspective. It is however recommended that landscaping of the watercourse and ornamental gardens includes the use of indigenous floral species as this will increase the floral diversity and subsequently the faunal habitat and diversity. Care should be taken during the construction and operation of the proposed park to prevent the further spread of alien invasive species. Rehabilitation activities should promote the establishment of indigenous species, particularly within the watercourse habitat to re-establish the available habitat and food sources for faunal species.
<b>Habitat Integrity</b>	The floral species composition has been completely transformed to cultivated lawns and alien invasive species, and as such the habitat integrity of the park is considered to be significantly compromised. Furthermore, the area is situated within a highly urbanised area. As such the connectivity of the area to a larger natural open space area is limited.		
<b>Habitat Availability</b>	As mentioned above the floral species composition has been significantly transformed and is limited to alien invasive species and species associated with disturbance, as such faunal species habitat availability is limited. As the vegetation is regularly mowed and burned, vegetation cover is limited, thereby decreasing the habitat required for breeding and areas refuge for faunal species.		



#### **4.4 Floral Species of Conservation Concern Assessment**

Threatened species are those species facing a high risk of extinction. Any species which is classified by the IUCN as Critically Endangered (CR), Endangered (EN) or Vulnerable (VU) is considered to be a threatened species. Floral Species of Conservation Concern (SCC) are species that have a high conservation importance in terms of preserving South Africa's high floristic diversity and include not only threatened species, but also those classified in the categories Extinct in the Wild (EW), Regionally Extinct (RE), Near Threatened (NT), Critically Rare, Rare and Declining.

An assessment considering the presence of any floral SCC, as well as suitable habitat to support any such species was undertaken. The SANBI PRECIS Red Data Listed plants as well as the GDARD conservation lists were acquired for the Quarter Degree Squares (QDS) 2628AA and 2528CC, in order to ascertain which floral species may be expected to occur within the study area, based on distribution records.

The SCC listed for the area together with their calculated Probability of Occurrence (POC) are tabulated in Appendix G.

None of the species listed in Appendix G scored a POC of 60% or more. During the field assessment none of the SCC listed in Appendix G were observed, nor are any expected to occur due to the floral habitat transformation and high levels of continuous anthropogenic related activities associated with Mashimong Park.

Should any floral SCC however be encountered during any phase of the proposed development, a suitably qualified specialist is to be consulted in terms of the best way forward, and if necessary the relevant provincial departments contacted in terms of acquiring the necessary plant relocation/removal permits.

#### **4.5 Faunal Species of Conservation Concern Assessment**

During field assessments it is not always feasible to identify or observe all species within the area under investigation, largely due to the secretive nature of many faunal species, possible low population numbers or varying habits of species. As such, and to specifically assess an area for faunal SCC, a Probability of Occurrence (POC) matrix is used, utilising a number of factors to determine the probability of faunal SCC occurrence within Mashimong Park. Species listed in Appendix H whose known distribution ranges and habitat preferences include Mashimong Park were taken into consideration.



During the site investigation, no faunal SCC were observed. Furthermore, due to the degraded nature of Mashimong Park and the area situated within a high density urban setting, it is deemed highly unlikely that any faunal SCC will occur within Mashimong Park. However, as a level of precaution it is recommended that should any faunal SCC listed in Appendix H of this report be encountered during the construction phase of the proposed upgrade, a biodiversity specialist must be consulted and a species-specific conservation plan designed and implemented where necessary.

## 5 SENSITIVITY MAPPING

All the ecological features associated with Mashimong Park was considered. The section below summarises the terrestrial sensitivity findings based on the presence or potential for floral and faunal SCC, habitat integrity and levels of disturbance, threat status of the habitat type, the presence of unique landscapes and overall levels of diversity. The table below presents the sensitivity of the identified habitat units along with an associated conservation objective and implications for the proposed upgrade of the park.

**Table 4: A summary of sensitivity of each habitat unit and implications for the proposed upgrade**

Habitat Unit	Sensitivity	Conservation Objective	Development Implications
Watercourse	Low	Optimise development potential.	The watercourse situated within Mashimong Park has been severely altered with the northern portion formalised and is associated with high levels of anthropogenic activities. The watercourse is dominated by the lawn grass <i>Pennisetum clandestinum</i> and other alien invasive plant species. As no floral or faunal SCC were observed within the watercourse, nor is it likely that any will utilise this section of the watercourse, the sensitivity from a terrestrial perspective is considered to be low. Development of the proposed footbridges across the watercourse can commence, however effort should be made not to undertake any construction and operational activities outside of the demarcated development footprint to limit edge effects. Areas within the watercourse that will be landscaped or were the banks will be re-established and profiled, should make use of indigenous grass and sedge species.
Transformed	Low	Optimise development potential.	This habitat unit has predominantly been transformed to cultivated lawns with high levels of anthropogenic related activities, including but not limited to illegal disposal of construction rubble, and informal brick production. As such from a floral perspective this habitat unit comprise of predominantly alien invasive species, with limited habitat and food availability for faunal species. The terrestrial ecological sensitivity is considered to be low. It is however advised that all bare areas outside of the watercourse that will be utilised as lawns should be seeded/ planted with <i>Dactyloctenium australe</i> (LM Grass) as opposed to <i>Pennisetum clandestinum</i> .







Figure 7: Sensitivity map of Mashimong Park.



## 6 IMPACT ASSESSMENT

The tables below serve to summarise the significance of perceived impacts on the terrestrial ecology of Mashimong Park, with each individual impact identified presented in Section 6.1 and 6.2 of this report. A summary of all potential pre-construction, construction and operational impacts is provided in Section 6.3. The tables below present the impact assessment according to the method described in Appendix D. All impacts are considered without mitigation taking place as well as with mitigation fully implemented. All the required mitigatory measures needed to minimise the impact is presented in Section 6.4.

### 6.1 Impacts of the Floral Ecology of Mashimong Park

#### Activities and aspects register

The table below identifies potential activities that might take place during the various phases of the proposed development, which could possibly impact on the floral ecology of the area. It should be noted that these activities listed in the table below were utilised during the impact assessment as pre-mitigated impacts to ascertain the significance of the perceived impacts prior to mitigation measures.

Construction	Operational
Site clearing and the removal of vegetation associated with the construction of the pathways, bridges, the caretakers house and the event space	Failure to address erosion activities leading to further loss of floral habitat particularly within the watercourse
Loss of floral diversity through invasion of alien and invasive floral species	Increased introduction and proliferation of alien plant species and further transformation of floral habitat due to poor rehabilitation measures
Movement of construction vehicles through the watercourse	Poor management and monitoring of rehabilitation measures
Dumping of construction material within the watercourse leading to further species loss and habitat disturbance	
Concrete runoff into surrounding habitat leading to surface hardening and limiting vegetation growth leading to permanent loss of floral diversity	
Potential uncontrolled fires due to increased human activity may impact on floral habitat	



### 6.1.1 IMPACT 1: Loss of Floral Habitat and Species Diversity

The floral habitat of the watercourse and transformed habitat units has been significantly degraded and transformed as a result of the northern portion currently being utilised as an existing park comprising predominantly of the lawn grass *P. clandestinum* (Kikuyu) which has extended into the banks of the watercourse. Furthermore, the southern portion is associated with anthropogenic activities such as illegal disposal of construction rubble, a recycling area, informal brick production and cultivation, which has resulted in severe habitat degradation and the proliferation of alien invasive species. As such the floral habitat associated with Mashimong Park is considered significantly transformed and no longer representative of the Carletonville Dolomite Grassland vegetation type. As such, the proposed upgrade of Mashimong Park is unlikely to significantly impact on the floral habitat or floral diversity of the area. Through ensuring overall footprint minimisation, effective rehabilitation activities and the implementation of mitigation measures stipulated in Section 6.6, the perceived impact significance can be managed and reduced. The impact significance associated with the loss of floral habitat and diversity is considered to be low prior to the implementation of mitigation measures, and very low with the implementation of mitigation measures.

Furthermore, the proposed upgrade of the park, may result in an increase in floral diversity by utilising indigenous grassland species within the landscaping of the project, as well as during reprofiling and bank stabilisation of the watercourse.

#### Impacts pertaining to floral habitat and diversity of the Watercourse habitat

Unmanaged								
	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Construction phase	4	1	2	2	2	5	6	30 (Low)
Operational phase	4	1	2	2	4	5	8	40 (Low)
Managed								
Managed	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Construction phase	2	1	1	1	2	3	4	12 (Very Low)
Operational phase	2	1	1	1	4	3	6	18 (Very Low)



### Impacts pertaining to floral habitat and diversity of the Transformed Habitat

Unmanaged								
	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Construction phase	4	1	2	2	2	5	6	30 (Low)
Operational phase	3	1	2	2	4	5	8	32 (Low)
Managed								
Managed	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Construction phase	3	1	1	1	2	4	4	16 (Very Low)
Operational phase	2	1	1	1	4	3	6	18 (Very Low)

#### 6.1.2 IMPACT 2: Impacts on Floral SCC

No floral SCC species were observed within Mashimong Park, nor are any expected to occur due to the habitat transformation and ongoing anthropogenic activities. Furthermore, it is highly likely that any floral SCC that historically might have been associated with the area, has been harvested for medicinal purposes. Since the site is in an area which is frequently used by people, it is highly probable that any floral SCC that may have once occurred have been subjected to overharvesting. As such the perceived impact significance on floral SCC is very low.

#### Impacts pertaining to possible floral SCC in the Watercourse habitat

Unmanaged								
	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Construction phase	1	1	2	2	2	2	6	12 (Very Low)
Operational phase	1	1	2	2	4	2	8	16 (Very Low)
Managed								
Managed	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Construction phase	1	1	1	1	2	2	4	8 (Very Low)
Operational phase	1	1	1	1	4	2	6	12 (Very Low)





**Impacts pertaining to possible floral SCC in the Transformed habitat**

Unmanaged								
	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Construction phase	1	1	2	2	2	2	6	12 (Very Low)
Operational phase	1	1	2	2	4	2	8	16 (Very Low)
Managed								
Managed	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Construction phase	1	1	1	1	2	2	4	8 (Very Low)
Operational phase	1	1	1	1	4	2	6	12 (Very Low)

**6.2 Impacts of the Faunal Ecology of Mashimong Park**

**Activities and aspect register**

Construction	Operational
Clearing of vegetation for the caretaker’s house, event space, footpaths and bridges, resulting in a loss of faunal habitat and diversity	Increased introduction and proliferation of alien plant species leading to further transformation of faunal habitat
Further degradation of faunal habitat through invasion of alien species in disturbed areas	Continued habitat loss within the operational footprint and surrounding areas
Movement of construction vehicles through faunal habitat leading to possible faunal mortalities from vehicles	
Possible increased fire frequency during construction leading to a loss or altering of faunal habitat and species diversity	
Increased risk of hunting/trapping of faunal species	

**6.2.1 IMPACT 3: Loss of Faunal Habitat and Species Diversity**

The overall faunal diversity within Mashimong Park is considered to be low as the park does not provide sufficient habitat and food resources for faunal species. As such faunal species encountered during the field assessment were limited to species adapted to survival within urban settings, and species adapted to acquiring food items from areas of disposed household waste. Due to the already degraded nature of the faunal habitat, it is unlikely that the proposed upgrade of the park will significantly impact upon faunal species habitat or the diversity therein. The impact significance is considered to be low prior to the implementation of mitigation measures, and very low following mitigation measures.

As discussed in Section 4.2, should indigenous floral species be utilised during landscaping in conjunction with the reprofiling and revegetation of the banks of the watercourse, it may



lead to an increase in faunal habitat and food availability, and subsequently an increase in faunal species diversity.

#### Impacts pertaining to faunal habitat and diversity of the Watercourse habitat

Unmanaged								
	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Construction phase	4	1	2	2	2	5	6	30 (Low)
Operational phase	4	1	2	2	4	5	8	40 (Low)
Managed								
Managed	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Construction phase	2	1	1	1	2	3	4	12 (Very Low)
Operational phase	2	1	1	1	4	3	6	18 (Very Low)

#### Impacts pertaining to faunal habitat and diversity of the Transformed habitat

Unmanaged								
	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Construction phase	4	1	2	2	2	5	6	30 (Low)
Operational phase	3	1	2	2	4	5	8	32 (Low)
Managed								
Managed	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Construction phase	3	1	1	1	2	4	4	16 (Very Low)
Operational phase	2	1	1	1	4	3	6	18 (Very Low)

### 6.2.2 IMPACT 4: Impact on Faunal SCC

No faunal SCC were observed within Mashimong Park. The urban setting, anthropogenic activities and transformed habitat can be attributed to the exclusion of faunal SCC from the park. The impact significance on faunal SCC ecology within the area is considered to be very low.



**Impacts pertaining to possible faunal SCC in the Watercourse habitat**

Unmanaged								
	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Construction phase	1	1	2	2	2	2	6	12 (Very Low)
Operational phase	1	1	2	2	4	2	8	16 (Very Low)
Managed								
Managed	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Construction phase	1	1	1	1	2	2	4	8 (Very Low)
Operational phase	1	1	1	1	4	2	6	12 (Very Low)

**Impacts pertaining to possible faunal SCC in the Transformed habitat**

Unmanaged								
	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Construction phase	1	1	2	2	2	2	6	12 (Very Low)
Operational phase	1	1	2	2	4	2	8	16 (Very Low)
Managed								
Managed	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial scale	Duration of impact	Likelihood	Consequence	Significance
Construction phase	1	1	1	1	2	2	4	8 (Very Low)
Operational phase	1	1	1	1	4	2	6	12 (Very Low)

**6.3 Assessment Summary**

The tables below summarise the findings indicating the significance of the impact before mitigation takes place and the likely impact if management and mitigation takes place. In the consideration of mitigation, it is assumed that a high level of mitigation takes place, but which does not lead to prohibitive costs. From the tables, it is evident that prior to mitigation the impacts on the various components of fauna and flora are low to very low significance impacts. If effective mitigation takes place, all impacts may be further reduced to very low levels.

**Table 5: A summary of the construction impact significance on the Watercourse habitat**

Impact	Unmanaged	Managed
1: Impact on habitat for floral species habitat and diversity	Low	Very Low
2: Impact on habitat for faunal species habitat and diversity	Low	Very Low
3: Impact on Floral SCC	Very Low	Very Low
4: Impact on Faunal SCC	Very Low	Very Low



**Table 6: A summary of the construction impact significance on the transformed habitat**

Impact	Unmanaged	Managed
1: Impact on habitat for floral species habitat and diversity	Low	Very Low
2: Impact on habitat for faunal species habitat and diversity	Low	Very Low
3: Impact on Floral SCC	Very Low	Very Low
4: Impact on Faunal SCC	Very Low	Very Low

**Table 7: A summary of the operational impact significance on the watercourse habitat**

Impact	Unmanaged	Managed
1: Impact on habitat for floral species habitat and diversity	Low	Very Low
2: Impact on habitat for faunal species habitat and diversity	Low	Very Low
3: Impact on Floral SCC	Very Low	Very Low
4: Impact on Faunal SCC	Very Low	Very Low

**Table 8: A summary of the operational impact significance on the transformed habitat**

Impact	Unmanaged	Managed
1: Impact on habitat for floral species habitat and diversity	Low	Very Low
2: Impact on habitat for faunal species habitat and diversity	Low	Very Low
3: Impact on Floral SCC	Very Low	Very Low
4: Impact on Faunal SCC	Very Low	Very Low

## 6.4 Integrated Impact Mitigation

### Mitigation Measures

- It is advised that a qualified landscape architect be consulted as to the landscaping of the project. The following should be taken into consideration during the landscaping of the park:
  - All areas within the watercourse that will be landscaped or reprofiled, should be reseeded/ planted with indigenous grass and sedge species as soon as possible to ensure that habitat is re-instated. The Mayford's Biomosone Grassveld Reclamation mixture can be used for such purposes;
  - All bare areas within the transformed habitat that will be utilised as lawn areas, should be reseeded with *Dactyloctenium australe* (LM Grass) as opposed to *Pennisetum clandestinum* (Kikuyu). All ornamental gardens should be planted with indigenous grassland species, as opposed to exotic garden ornamentals;
  - All newly planted/landscaped areas should be fenced off and monitored regularly until sufficient vegetation cover has been well established. During this period all alien invasive species that might have spread to these newly landscaped areas should be removed regularly (at least every second month) to allow indigenous species to become established;
- Alien vegetation as listed in Appendix F, with the exception of *Pennisetum clandestinum* must be removed from Mashimong Park during the construction phase





of the proposed park upgrade, with specific mention of Category 1b species in line with the NEMBA Alien and Invasive Species Regulations (2016);

- Should any floral or faunal SCC although considered highly unlikely, however be encountered within Mashimong Park, the following should be ensured:
  - The relevant specialists are to be consulted in order to determine the best way forward;
  - Should relocation of individuals be determined as the best feasible option, individuals are to be relocated to suitable similar habitat in the vicinity of the development;
  - All rescue and relocation plans should be overseen by a suitably qualified specialist;
- No trapping or hunting of any faunal species is to take place during any phases of the proposed park upgrade;
- Informal fires by construction personnel are to be prohibited;
- Edge effects of construction and maintenance activities needs to be actively managed so as to minimise further impacts to the receiving environment;
- Establishment of reintroduced vegetation must be monitored following the construction phase for a period of 1 year;
- Appropriate sanitary facilities must be provided during the construction phase and all waste must be removed to an appropriate waste facility;
- All soils compacted as a result of construction activities (construction camp, access roads) should be ripped and profiled and reseeded. Special attention should be paid to alien and invasive plant control within these areas;
- No dumping of waste should take place. Furthermore, all rubble and waste currently associated with Mashimong Park should be cleared and the terrestrial areas rehabilitated appropriately;
- “No littering” signs should be located at all entrances to the park as well as along the watercourse, with rubbish bins placed at regular intervals within the park. The municipality is to be responsible for the removal of waste/rubbish from the bins;
- In the case where construction vehicles are left on site during non-working hours, drip trays should be placed underneath each vehicle to avoid ground and surface water pollution. If any spills occur, they should be immediately cleaned up;
- In the event of a breakdown, maintenance of vehicles must take place with care and the recollection of spillage should be practiced to prevent the ingress of hydrocarbons into the topsoil;



- Upon completion of construction activities, it must be ensured that no bare areas remain and that indigenous plant species are reintroduced as specified in bullet one of this section (section 6.4); and
- Edge effect control needs to be implemented within construction areas, with specific consideration to erosion control and alien floral species management.

**Rehabilitation Plan:**

- Disturbed and cleared areas need to be revegetated with indigenous species in order to help stabilise the soil surface;
- All alien and invasive plant species within Mashimong Park, with the exception of *P. clandestinum* should be cleared, with follow up activities running concurrently for a minimum of one year; and
- Soils that have been compacted as a result of the construction and operational activities must be ripped and profiled in line with the surrounding area.

**Possible latent impacts:**

- Continued loss of and altered floral and faunal species habitat and diversity;
- Alien and invasive floral species proliferation;



## 7 CONCLUSION

Scientific Aquatic Services (SAS) was appointed to conduct a terrestrial ecological sensitivity scan as part of the Environmental Impact Assessment (EIA) and Authorisation Process for the proposed upgrade of the Mashimong Park within Tembisa, Gauteng Province by the City of Ekurhuleni Metropolitan Municipality.

The objective of this study was to provide sufficient information on the faunal and floral ecology of the area, together with other studies on the physical and socio-cultural environment, in order for the Environmental Assessment Practitioner (EAP) and the relevant authorities to apply the principles of Integrated Environmental Management (IEM) and the concept of sustainable development. The needs for conservation as well as the risks to other spheres of the physical and socio-cultural environment need to be compared and considered along with the need to ensure economic development of the country.

From the site assessment it is evident that Mashimong Park and the watercourse associated with the park, has been subjected to high levels on anthropogenic related activities which has resulted in degradation and transformation of the Park and watercourse to cultivated *P. clandestinum* (Kikuyu) lawns as well as alien invasive species proliferation. The park is furthermore subjected to ongoing anthropogenic activities, such as disposal of household waste and construction rubble, cultivated *Brassica oleracea var. capitata* (Cabbage), as well as informal brick production amongst others. As such the floral and faunal ecology of Mashimong Park is considered to be severely degraded and of low ecological importance and sensitivity. The impact of the proposed park upgrade was undertaken for floral and faunal habitat, diversity and SCC, where the impact on the floral and faunal ecology was determined to be low to very low significance impacts during both the construction and operation phase prior to the implementation of mitigation measures. With the sufficient implementation of mitigation measures, all impacts can be reduced to very low levels.

It is the opinion of the ecologists that this study provides the relevant information required in order to implement IEM and to ensure that the best long-term use of the ecological resources in the area will be made in support of the principle of sustainable development. It is the opinion of the ecologist that provided all mitigation measures are adhered to and implemented, the construction of proposed upgrade of Mashimong Park is unlikely to have a significant long-term impact on the terrestrial ecology of the area and can potentially result in an increase of floral and faunal diversity should indigenous species be utilized within the landscaping of the project.



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## APPENDIX A - Legislative Requirements

### National Environmental Management Act, 1998

The National Environmental Management Act (NEMA; Act 107 of 1998) and the associated Environmental Impact Assessment (EIA) Regulations (GN R982 of 2014) and well as listing notices 1, 2 and 3 (GN R983, R984 and R985 of 2014), state that prior to any development taking place which triggers any activity as listed within the abovementioned regulations, an environmental authorisation process needs to be followed. This could follow either the Basic Assessment process or the EIA process depending on the nature of the activity and scale of the impact.

### National Environmental Management Biodiversity Act (NEMBA, Act No. 10 of 2004)

The objectives of this act are (within the framework of NEMA) to provide for:

- The management and conservation of biological diversity within the Republic of South Africa and of the components of such diversity;
- The use of indigenous biological resources in a sustainable manner;
- The fair and equitable sharing among stakeholders of the benefits arising from bio prospecting involving indigenous biological resources;
- To give effect to ratify international agreements relating to biodiversity which are binding to the Republic;
- To provide for cooperative governance in biodiversity management and conservation; and
- To provide for a South African National Biodiversity Institute to assist in achieving the objectives of this Act.

This act alludes to the fact that management of biodiversity must take place to ensure that the biodiversity of the surrounding areas is not negatively affected, by any activity being undertaken, in order to ensure the fair and equitable sharing among stakeholders of the benefits arising from indigenous biological resources.

Furthermore, a person may not carry out a restricted activity involving either:

- a) A specimen of a listed threatened or protected species;
- b) Specimens of an alien species; or
- c) A specimen of a listed invasive species without a permit.

### Conservation of Agricultural Resources Act (CARA, Act 43 of 1983)

Removal of the alien and weed species encountered in the mining permit application area must take place in order to comply with existing legislation (amendments to the regulations under the CARA, 1983 and Section 28 of the NEMA, 1998). Removal of species should take place throughout the construction and operation, phases.

### GDARD Requirements for Biodiversity Assessments Version 3 (GDARD, 2014b).

The biodiversity assessment must comply with the minimum requirements as stipulated by GDARD Version 3 of 2014 and must contain the following information:

- A location and description of the application site and proposed activities;
- Photographic record and description of the site characteristics and inventories of the faunal and floral species observed on site, with special mention to Red Listed species;
- Sensitivity map displaying all sensitive areas and associated buffers as listed in the Sensitivity Mapping Rules for Biodiversity Assessments section of GDARD V3 (2014); and
- A list of recommendations and mitigation measures to reduce the potential environmental impacts that the proposed development might have on the terrestrial ecology associated with the site.



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The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. The report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken and SAS CC and its staff reserve the right to modify aspects of the report including the recommendations if and when new information may become available from ongoing research or further work in this field or pertaining to this investigation.

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## APPENDIX B - Floral Method of assessment

### *Floral Method of Assessment*

#### Floral Species of Conservational Concern Assessment

Prior to the field visit, a record of floral SCC and their habitat requirements was acquired from SANBI for the Quarter Degree Square in which the study area is situated, as well as relevant regional, provincial and national lists. Throughout the floral assessment, special attention was paid to the identification of any of these SCC as well as the identification of suitable habitat that could potentially support these species.

The Probability of Occurrence (POC) for each floral SCC was determined using the following calculations wherein the distribution range for the species, specific habitat requirements and level of habitat disturbance were considered. The accuracy of the calculation is based on the available knowledge about the species in question, with many of the species lacking in-depth habitat research.

Each factor contributes an equal value to the calculation.

Distribution						
	Outside of known distribution range					Inside known distribution range
Site score						
EVC 1 score	0	1	2	3	4	5
Habitat availability						
	No habitat available					Habitat available
Site score						
EVC 1 score	0	1	2	3	4	5
Habitat disturbance						
	0	Very low	Low	Moderate	High	Very high
Site score						
EVC 1 score	5	4	3	2	1	0

$[(\text{Distribution} + \text{Habitat availability} + \text{Habitat disturbance}) / 15 \times 100 = \text{POC}\%$

#### Floral Habitat Sensitivity

The floral habitat sensitivity of each habitat unit was determined by calculating the mean of five different parameters which influence floral communities and provide an indication of the overall floristic ecological integrity, importance and sensitivity of the habitat unit. Each of the following parameters are subjectively rated on a scale of 1 to 5 (1 = lowest and 5 = highest):

- **Floral SCC:** The confirmed presence or potential for floral SCC or any other significant species, such as endemics, to occur within the habitat unit;
- **Unique Landscapes:** The presence of unique landscapes or the presence of an ecologically intact habitat unit in a transformed region;
- **Conservation Status:** The conservation status of the ecosystem or vegetation type in which the habitat unit is situated based on local, regional and national databases;
- **Floral Diversity:** The recorded floral diversity compared to a suitable reference condition such as surrounding natural areas or available floristic databases; and
- **Habitat Integrity:** The degree to which the habitat unit is transformed based on observed disturbances which may affect habitat integrity.

Each of these values contribute equally to the mean score, which determines the floral habitat sensitivity class in which each habitat unit falls. A conservation and land-use objective is also assigned to each sensitivity class which aims to guide the responsible and sustainable utilization of the habitat unit in question. In order to present the results use is made of spider diagrams to depict the significance of each aspect of floral ecology for each vegetation type. The different classes and land-use objectives are presented in the table below:



**Table B1: Floral habitat sensitivity rankings and associated land-use objectives.**

Score	Rating significance	Conservation objective
1> and <2	Low	Optimise development potential.
2> and <3	Moderately low	Optimise development potential while improving biodiversity integrity of surrounding natural habitat and managing edge effects.
3> and <4	Intermediate	Preserve and enhance biodiversity of the habitat unit and surrounds while optimising development potential.
4> and <5	Moderately high	Preserve and enhance the biodiversity of the habitat unit, limit development and disturbance.
5	High	Preserve and enhance the biodiversity of the habitat unit, no-go alternative must be considered.





## APPENDIX C - Faunal Method of Assessment

### *Faunal Assessment Methodology*

A reconnaissance 'walk through' on foot was undertaken to determine the general habitat types found throughout the study area. Special emphasis was placed on areas that may potentially support faunal SCC. Sites were investigated on foot in order to identify the occurrence of the dominant faunal communities, species and habitat diversities. The presence of any faunal inhabitants of the study area was also assessed through direct visual observation or identifying such species through calls, tracks, scats and burrows.

It is important to note that faunal species have varied life cycles, breeding patterns, and are subject to seasonal fluctuations. As such, it is unlikely that all faunal species will have been recorded during the site assessment. However, even though some faunal species may not have been identified during the sight assessment, when taking into consideration the available background species lists, observed habitat units and the degree of transformation, it is possible to establish a relatively accurate understanding of faunal assemblages that are most likely to be associated with the mining permit application area.

### Faunal Species of Conservational Concern Assessment

The Probability of Occurrence (POC) for each faunal SCC was determined using the following four parameters:

- Species distribution;
- Habitat availability;
- Food availability; and
- Habitat disturbance.

The accuracy of the calculation is based on the available knowledge about the species in question. Therefore, it is important that the literature available is also considered during the calculation.

Each factor contributes an equal value to the calculation.

Scoring Guideline				
<b>Habitat availability</b>				
<b>No Habitat</b>	<b>Very low</b>	<b>Low</b>	<b>Moderate</b>	<b>High</b>
1	2	3	4	5
<b>Food availability</b>				
<b>No food available</b>	<b>Very low</b>	<b>Low</b>	<b>Moderate</b>	<b>High</b>
1	2	3	4	5
<b>Habitat disturbance</b>				
<b>Very High</b>	<b>High</b>	<b>Moderate</b>	<b>Low</b>	<b>Very Low</b>
1	2	3	4	5
<b>Distribution/Range</b>				
<b>Not Recorded</b>		<b>Historically Recorded</b>		<b>Recently Recorded</b>
1		3		5

[Habitat availability + Food availability + Habitat disturbance + Distribution/Range] / 20 x 100 = POC%



## Faunal Habitat Sensitivity

The sensitivity of the study area for each faunal class (i.e. mammals, birds, reptiles, amphibians and invertebrates) was determined by calculating the mean of five different parameters which influence each faunal class and provide an indication of the overall faunal ecological integrity, importance and sensitivity of the study area for each class. Each of the following parameters are subjectively rated on a scale of 1 to 5 (1 = lowest and 5 = highest):

- **Faunal SCC:** The confirmed presence or potential for faunal SCC or any other significant species, such as endemics, to occur within the habitat unit;
- **Habitat Availability:** The presence of suitable habitat for each class;
- **Food Availability:** The availability of food within the study area for each faunal class;
- **Faunal Diversity:** The recorded faunal diversity compared to a suitable reference condition such as surrounding natural areas or available faunal databases; and
- **Habitat Integrity:** The degree to which the habitat is transformed based on observed disturbances which may affect habitat integrity.

Each of these values contribute equally to the mean score, which determines the suitability and sensitivity of the study area for each faunal class. A conservation and land-use objective is also assigned to each sensitivity class which aims to guide the responsible and sustainable utilization of the study area in relation to each faunal class. The different classes and land-use objectives are presented in the table below:

**Table C1: Faunal habitat sensitivity rankings and associated land-use objectives.**

Score	Rating significance	Conservation objective
1> and <2	Low	Optimise development potential.
2> and <3	Moderately low	Optimise development potential while improving biodiversity integrity of surrounding natural habitat and managing edge effects.
3> and <4	Intermediate	Preserve and enhance biodiversity of the habitat unit and surrounds while optimising development potential.
4> and <5	Moderately high	Preserve and enhance the biodiversity of the habitat unit limit development and disturbance.
5	High	Preserve and enhance the biodiversity of the habitat unit, no-go alternative must be considered.



## APPENDIX D - Impact Assessment Methodology

### *Ecological Impact Assessment Method*

In order for the Environmental Assessment Practitioner (EAP) to allow for sufficient consideration of all environmental impacts, impacts were assessed using a common, defensible method of assessing significance that will enable comparisons to be made between risks/impacts and will enable authorities, stakeholders and the client to understand the process and rationale upon which risks/impacts have been assessed. The method to be used for assessing risks/impacts is outlined in the sections below.

The first stage of risk/impact assessment is the identification of environmental activities, aspects and impacts. This is supported by the identification of receptors and resources, which allows for an understanding of the impact pathway and an assessment of the sensitivity to change. The definitions used in the impact assessment are presented below.

- An **activity** is a distinct process or task undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or infrastructure that is possessed by an organisation.
- An **environmental aspect** is an 'element of an organizations activities, products and services which can interact with the environment'<sup>3</sup>. The interaction of an aspect with the environment may result in an impact.
- **Environmental risks/impacts** are the consequences of these aspects on environmental resources or receptors of particular value or sensitivity, for example, disturbance due to noise and health effects due to poorer air quality. In the case where the impact is on human health or wellbeing, this should be stated. Similarly, where the receptor is not anthropogenic, then it should, where possible, be stipulated what the receptor is.
- **Receptors** can comprise, but are not limited to, people or human-made systems, such as local residents, communities and social infrastructure, as well as components of the biophysical environment such as wetlands, flora and riverine systems.
- **Resources** include components of the biophysical environment.
- **Frequency of activity** refers to how often the proposed activity will take place.
- **Frequency of impact** refers to the frequency with which a stressor (aspect) will impact on the receptor.
- **Severity** refers to the degree of change to the receptor status in terms of the reversibility of the impact; sensitivity of receptor to stressor; duration of impact (increasing or decreasing with time); controversy potential and precedent setting; threat to environmental and health standards.
- **Spatial extent** refers to the geographical scale of the impact.
- **Duration** refers to the length of time over which the stressor will cause a change in the resource or receptor.

The significance of the impact is then assessed by rating each variable numerically according to the defined criteria. Refer to the Table C2. The purpose of the rating is to develop a clear understanding of influences and processes associated with each impact. The frequency of the activity and the frequency of the impact together comprise the likelihood of the impact occurring and can obtain a maximum value of 10. The severity, spatial scope and duration of the impact together comprise the consequence of the impact and when summed can obtain a maximum value of 15. The values for likelihood and consequence of the impact are then read off a significance-rating matrix and are used to determine whether mitigation is necessary<sup>4</sup>.

The assessment of significance is undertaken twice. Initially, significance is based on only natural and existing mitigation measures (including built-in engineering designs). The subsequent assessment takes into account the recommended management measures required to mitigate the impacts. Measures such as demolishing infrastructure, and reinstatement and rehabilitation of land, are considered post-mitigation.

<sup>3</sup> The definition has been aligned with that used in the ISO 14001 Standard.

<sup>4</sup> Some risks/impacts that have low significance will however still require mitigation.



The model outcome of the impacts was then assessed in terms of impact certainty and consideration of available information. The Precautionary Principle is applied in line with South Africa's National Environmental Management Act (No. 108 of 1997) in instances of uncertainty or lack of information, by increasing assigned ratings or adjusting final model outcomes. In certain instances, where a variable or outcome requires rational adjustment due to model limitations, the model outcomes have been adjusted.

**Table D1: Criteria for assessing significance of impacts**

### LIKELIHOOD DESCRIPTORS

<b>Probability of impact</b>	<b>RATING</b>
Highly unlikely	1
Possible	2
Likely	3
Highly likely	4
Definite	5
<b>Sensitivity of receiving environment</b>	<b>RATING</b>
Ecology not sensitive/important	1
Ecology with limited sensitivity/importance	2
Ecology moderately sensitive/ important	3
Ecology highly sensitive /important	4
Ecology critically sensitive /important	5

### CONSEQUENCE DESCRIPTORS

<b>Severity of impact</b>	<b>RATING</b>
Insignificant / ecosystem structure and function unchanged	1
Small / ecosystem structure and function largely unchanged	2
Significant / ecosystem structure and function moderately altered	3
Great / harmful/ ecosystem structure and function largely altered	4
Disastrous / ecosystem structure and function seriously to critically altered	5
<b>Spatial scope of impact</b>	<b>RATING</b>
Activity specific/ < 5 ha impacted / Study areas affected < 100m	1
Development specific/ within the site boundary / < 100ha impacted / Study areas affected < 100m	2
Local area/ within 1 km of the site boundary / < 5000ha impacted / Study areas affected < 1000m	3
Regional within 5 km of the site boundary / < 2000ha impacted / Study areas affected < 3000m	4
Entire habitat unit / Entire system/ > 2000ha impacted / Study areas affected > 3000m	5
<b>Duration of impact</b>	<b>RATING</b>
One day to one month	1
One month to one year	2
One year to five years	3
Life of operation or less than 20 years	4
Permanent	5



Table D2: Significance Rating Matrix.

		CONSEQUENCE (Severity + Spatial Scope + Duration)														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
LIKELIHOOD (Frequency of activity + Frequency of impact)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105	
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135	
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	

Table D3: Positive/Negative Mitigation Ratings.

Significance Rating	Value	Negative Impact Management Recommendation	Positive Impact Management Recommendation
Very high	126-150	Critically consider the viability of proposed projects Improve current management of existing projects significantly and immediately	Maintain current management
High	101-125	Comprehensively consider the viability of proposed projects Improve current management of existing projects significantly	Maintain current management
Medium-high	76-100	Consider the viability of proposed projects Improve current management of existing projects	Maintain current management
Medium-low	51-75	Actively seek mechanisms to minimise impacts in line with the mitigation hierarchy	Maintain current management and/or proposed project criteria and strive for continuous improvement
Low	26-50	Where deemed necessary seek mechanisms to minimise impacts in line with the mitigation hierarchy	Maintain current management and/or proposed project criteria and strive for continuous improvement
Very low	1-25	Maintain current management and/or proposed project criteria and strive for continuous improvement	Maintain current management and/or proposed project criteria and strive for continuous improvement

The following points were considered when undertaking the assessment:

- Risks and impacts were analysed in the context of the *project's area of influence* encompassing:
  - Primary project site and related facilities that the client and its contractors develop or controls;
  - Areas potentially impacted by cumulative impacts for any existing project or condition and other project-related developments; and
  - Areas potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location.
- Risks/Impacts were assessed for all stages of the project cycle including:
  - Pre-construction;
  - Construction; and
  - Operation.
- If applicable, transboundary or global effects were assessed.





- Individuals or groups who may be differentially or disproportionately affected by the project because of their *disadvantaged* or *vulnerable* status were assessed.
- Particular attention was paid to describing any residual impacts that will occur after rehabilitation.

### ***Mitigation measure development***

The following points present the key concepts considered in the development of mitigation measures for the proposed development.

- *Mitigation and performance improvement measures* and actions that address the risks and impacts<sup>5</sup> are identified and described in as much detail as possible.
- Measures and actions to address negative impacts will favour avoidance and prevention over minimisation, mitigation or compensation.
- Desired outcomes are defined and have been developed in such a way as to be *measurable events with performance indicators, targets and acceptable criteria* that can be tracked over *defined periods*, with estimates of the *resources* (including human resource and training requirements) *and responsibilities for implementation*.

### ***Recommendations***

Recommendations were developed to address and mitigate impacts associated with the proposed development. These recommendations also include general management measures which apply to the proposed development as a whole. Mitigation measures have been developed to address issues in all phases throughout the life of the operation from planning, through to construction and operation.

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<sup>5</sup> *Mitigation measures should address both positive and negative impacts*



## APPENDIX E - Vegetation Types

Table E1: Dominant and typical floristic species of *Carletonville Dolomite Grassland* (Mucina & Rutherford, 2006).

Plant Community	Species
<b>Graminoids</b>	<i>Aristida congesta</i> (d), <i>Brachiaria serrata</i> (d), <i>Cynodon dactylon</i> (d), <i>Digitaria tricholaenoides</i> (d), <i>Diheteropogon amplexans</i> (d), <i>Eragrostis chloromelas</i> (d), <i>E. racemosa</i> (d), <i>Heteropogon contortus</i> (d), <i>Loudetia simplex</i> (d), <i>Schizachyrium sanguineum</i> (d), <i>Setaria sphacelata</i> (d), <i>Themeda triandra</i> (d), <i>Alloteropsis semialata</i> subsp. <i>eckloniana</i> , <i>Andropogon schirensis</i> , <i>Aristida canescens</i> , <i>A. diffusa</i> , <i>Bewisia biflora</i> , <i>Bulbostylis burchellii</i> , <i>Cymbopogon caesius</i> , <i>C. pospischilii</i> , <i>Elionurus muticus</i> , <i>Eragrostis curvula</i> , <i>E. gummiflua</i> , <i>E. plana</i> , <i>Eustachys paspaloides</i> , <i>Hyparrhenia hirta</i> , <i>Melinis nerviglumis</i> , <i>M. repens</i> subsp. <i>repens</i> , <i>Monocymbium ceresiiforme</i> , <i>Panicum coloratum</i> , <i>Pogonarthria squarrosa</i> , <i>Trichoneura grandiglumis</i> , <i>Triraphis andropogonoides</i> , <i>Tristachya leucothrix</i> , <i>T. rehmannii</i> .
<b>Herbs</b>	<i>Acalypha angustata</i> , <i>Barleria macrostegia</i> , <i>Chamaecrista mimosoides</i> , <i>Chamaesyce inaequilatera</i> , <i>Crabbea angustifolia</i> , <i>Dianthus mooiensis</i> , <i>Dicoma anomala</i> , <i>Helichrysum caespititum</i> , <i>H. miconiifolium</i> , <i>H. nudifolium</i> var. <i>nudifolium</i> , <i>Ipomoea ommaneyi</i> , <i>Justicia anagalloides</i> , <i>Kohautia amatymbica</i> , <i>Kyphocarpa angustifolia</i> , <i>Ophrestia oblongifolia</i> , <i>Pollichia campestris</i> , <i>Senecio coronatus</i> , <i>Vernonia oligocephala</i> .
<b>Geophytic Herbs</b>	<i>Boophone disticha</i> , <i>Habenaria mossii</i> .
<b>Low Shrubs</b>	<i>Anthospermum rigidum</i> subsp. <i>pumilum</i> , <i>Indigofera comosa</i> , <i>Pygmaeothamnus zeyheri</i> var. <i>rogersii</i> , <i>Rhus magalismontana</i> , <i>Tylosema esculentum</i> , <i>Ziziphus zeyheriana</i> .
<b>Geoxylic Suffrutices</b>	<i>Elephantorrhiza elephantina</i> , <i>Parinari capensis</i> subsp. <i>capensis</i> .

\*(d) – Dominant species for the vegetation type.



## APPENDIX F - Species List

**Table F1: Dominant floral species encountered within Mashimong Park. Alien species are indicated with an asterisk (\*). Also indicated are species falling within an alien invasive category as per the National Environmental Management: Biodiversity Act (Act 10 of 2004): Alien and Invasive Species Regulations, 2016. Those species with medicinal properties are underlined.**

Grasses and sedges	Forbs and groundcovers	Trees and shrubs
<i>*Bromus catharticus</i>	<i>*Alternanthera pungens</i>	<i>*Harrisia martini 1b</i>
<i>*Pennisetum clandestinum 1b</i>	<i>*Amaranthus hybridus</i> subsp. <i>hybridus</i>	<i>*Prunus persica</i>
<i>Brachiaria eruciformis</i>	<i>*Argemone mexicana 1b</i>	<i>*Ricinus communis</i> var. <i>communis 2</i>
<i>Chloris pycnothrix</i>	<i>*Argemone ochroleuca 1b</i>	<i>*Solanum mauritianum 1b</i>
<i>Cyperus eragrostis</i>	<i>*Bidens Pilosa</i>	<i>Combretum</i> sp.
<i>Cyperus</i> sp.	<i>Brassica oleracea</i> var. <i>capitata</i>	<i>Senna</i> sp.
<i>Panicum maximum</i>	<i>*Conyza bonariensis</i>	<u><i>Vachellia karroo</i></u>
<i>Paspalum dilatatum</i>	<i>*Datura stramonium 1b</i>	<i>Yucca elephantipe</i>
<i>Sporobolus africanus</i>	<i>*Flaveria bidentis 1b</i>	
<i>Typha capensis</i>	<i>*Hypochaeris radicata</i>	
	<i>*Ipomoea</i> sp.	
	<i>*Lamium amplexicaule</i>	
	<i>*Malva</i> sp.	
	<i>*Mirabilis jalapa 1b</i>	
	<i>*Persicaria lapathifolia</i>	
	<i>*Plantago lanceolate</i>	
	<i>*Schkuhria pinnata</i>	
	<i>*Sonchus asper</i>	
	<i>*Tagetes minuta</i>	

**1a: Category 1a** – Invasive species that require compulsory control.

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

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

**3: Category 3** – Ornamentally used plants that may no longer be planted; existing plants may remain, except within the flood line of watercourses and wetlands, as long as all reasonable steps are taken to prevent their spread (Bromilow, 2001).

**Table F2: Mammal species observed**

Scientific name	Common Name	IUCN Red List Status
<i>Rattus</i>	Common Black Rat	LC

LC = Least Concern

**Table F3: Avifaunal species observed**

Scientific name	Common Name	IUCN Red List Status
<i>Streptopelia capicola</i>	Cape turtle-dove	LC
<i>Streptopelia senegalensis</i>	Laughing dove	LC
<i>Bostrychia hagedash</i>	Hadedda Ibis	LC
<i>Acridotheres tristis</i>	Common Myna	LC
<i>Ploceus velatus</i>	Southern Masked-weaver	LC
<i>Larus cirrocephalus</i>	Grey-headed Gull	

LC = Least concerned. NT = Near Threatened, NYBA = Not yet been assessed by the IUCN.



**Table F4: Insect species likely to occur within Mashimong Park**

<b>Scientific Name</b>	<b>Common Name</b>	<b>IUCN Status</b>
<i>Belenois aurota</i>	Brown-veined White	NYBA
<i>Eurema brigitta</i>	Broad-bordered Grass Yellow	NYBA
<i>Zonocerus elegans</i>	Elegant Grasshopper	LC
<i>Junonia hierta</i>	Yellow Pansy	LC
<i>Danaus chrysippus</i>	African Monarch	NYBA
<i>Musca domestica</i>	House Fly	NYBA
<i>Anoplolepis custodiens</i>	Pugnacious Ant	NYBA
<i>Apis mellifera</i>	Honey Bee	NYBA

NYBA = Not Yet Been Assessed, LC = Least Concern



## APPENDIX G – Floral SCC

**Table F1: PRECIS plant list and GDARD Red and Orange Plant list for the QDS 2528CC and 2628AA (Raimondo *et al.*, 2009; SANBI, [www.sanbi.org](http://www.sanbi.org)).**

Family	Species	National Threat status	Provincial Status	Habitat	POC %
Acanthaceae	<i>Dicliptera magaliesbergensis</i>	VU	VU	Forest, savanna (Riverine forest and bush).	0
Aizoaceae	<i>Delosperma gautengense</i>	VU	VU	Amongst rocks on south-facing slopes.	0
Aizoaceae	<i>Delosperma purpureum</i>	EN	EN	South-facing slopes, in shallow soils among crystalline or conglomerate quartzitic rocks, in sun or in partial shade, rarely in shade, in grassland with some trees	0
Amaryllidaceae	<i>Boophone disticha</i>	LC	Declining	Dry grassland and rocky areas.	20
Amaryllidaceae	<i>Crinum macowanii</i>	LC	Declining	Mountain grassland and stony slopes in hard dry shale, gravelly soil or sandy flats	40
Apocynaceae	<i>Ceropegia decidua</i> subsp. <i>pretoriensis</i>	VU	VU	Associated with ridges and quartzitic rocky outcrops in pockets of soil among rocks in direct sunshine or shaded areas	0
Apocynaceae	<i>Miraglossum laeve</i>	CR PE	CR	Hills in Gold Reef Mountain Bushveld and possibly Gauteng Shale Mountain Bushveld	0
Apocynaceae	<i>Stenostelma umbelluliferum</i>	NT	NT	Deep black turf in open woodland mainly in the vicinity of drainage lines	0
Aquifoliaceae	<i>Ilex mitis</i> var. <i>mitis</i>	LC	Declining	Along rivers and streams in forest and thickets, sometimes in the open. Found from sea level to inland mountain slopes	0
Asteraceae	<i>Callilepis leptophylla</i>	LC	Declining	Grassland or open woodland, often on rocky outcrops or rocky hill slopes	0
Asteraceae	<i>Cineraria austrotransvaalensis</i>	NT	NT	Amongst rocks on steep hills and ridges, at the edge of thick bush or under trees on a range of rock types: quartzite, dolomite and shale, 1400-1700 m	0
Asteraceae	<i>Cineraria longipes</i>	VU	VU	Grassland, amongst rocks and along seepage lines, exclusively on basalt koppies on south-facing slopes	0
Asteraceae	<i>Gnaphalium nelsonii</i>	NT	NT	Seasonally wet places in grassland and savanna, and along dry watercourses.	0
Capparaceae	<i>Cleome conrathii</i>	NT	NT	Stony quartzite slopes, usually in red sandy soil, grassland or deciduous woodland, all aspects.	0
Crassulaceae	<i>Adromischus umbraticola</i> subsp. <i>umbraticola</i>	NT	NT	South-facing rock crevices on ridges, restricted to Gold Reef Mountain Bushveld in the northern parts of its range, and Andesite Mountain Bushveld in the south	0
Crassulaceae	<i>Crassula arborescens</i> subsp. <i>undulatifolia</i>	Critically Rare	Not Listed	Lower rocky slopes in sheltered ravines	0
Fabaceae	<i>Indigofera hybrida</i>	VU	Not Listed	Dry highveld grassland	0
Fabaceae	<i>Melolobium subspicatum</i>	VU	VU	Grassland.	0
Fabaceae	<i>Pearsonia bracteata</i>	NT	NT	Plateau grassland	0
Gunneraceae	<i>Gunnera perpensa</i>	LC	Declining	Damp marshy area and vleis from coast to 2400 m	0
Hyacinthaceae	<i>Bowiea volubilis</i> subsp. <i>volubilis</i>	VU	VU	Low and medium altitudes, usually along mountain ranges and in thickly vegetated river	0





Family	Species	National Threat status	Provincial Status	Habitat	POC %
				valleys, often under bush clumps and in boulder screes, sometimes found scrambling at the margins of karroid, succulent bush in the Eastern Cape. Occurs in bushy kloofs at the coast and inland in KwaZulu-Natal. In Gauteng, Mpumalanga and North West Province it is often found in open woodland or on steep rocky hills usually in well-shaded situations. Tolerates wet and dry conditions, growing predominantly in summer rainfall areas with an annual rainfall of 200-800 mm	
Hyacinthaceae	<i>Drimia sanguinea</i>	NT	NT	Open veld and scrubby woodland in a variety of soil types.	0
Hyacinthaceae	<i>Eucomis autumnalis</i>	LC	Declining	Damp, open grassland and sheltered places from the coast to 2450 m	10
Hypoxidaceae	<i>Hypoxis hemerocallidea</i>	LC	Declining	Occurs in a wide range of habitats, including sandy hills on the margins of dune forests, open, rocky grassland, dry, stony, grassy slopes, mountain slopes and plateaus. Appears to be drought and fire tolerant	20
Mesembryanthemaceae	<i>Khadia beswickii</i>	VU	VU	Open shallow soil over rocks in grassland	0
Mesembryanthemaceae	<i>Lithops lesliei</i> . subsp. <i>lesliei</i>	NT	NT	Primarily in arid grasslands, usually in rocky places, growing under the protection of forbs and grasses.	0
Orchidaceae	<i>Brachycorythis conica</i> subsp. <i>transvaalensis</i> .	CR	CR	Short, open grassland and wooded grassland, on sandy gravel overlying dolomite, sometimes also on quartzite, 1 000-1 705 m.	0
Orchidaceae	<i>Habenaria barbertoni</i>	NT	NT	Rocky hillsides, in bushveld in association with acacias, 1000-1500 m	0
Orchidaceae	<i>Habenaria bicolor</i>	NT	NT	Well-drained grasslands at around 1600 m in South Africa	0
Orchidaceae	<i>Habenaria kraenzliniana</i>	NT	NT	Stony, grassy hillsides, 1000-1400 m	0
Orchidaceae	<i>Habenaria mossii</i>	EN	EN	Open grassland on dolomite or in black, sandy soil.	0
Orchidaceae	<i>Holothrix micrantha</i>	CR PE	CR	Grassy cliffs, 1500-1800 m	0
Orchidaceae	<i>Holothrix randii</i>	NT	NT	Grassy slopes and rock ledges, usually southern aspects	0
Pteridaceae	<i>Cheilanthes deltoidea</i> subsp. <i>silicicola</i>	VU	VU	Southwest-facing soil pockets and rock crevices in chert rock	0

CR PE= Critically Endangered Potentially Extinct, CR = Critically Endangered; VU = Vulnerable; NT = Near Threatened; LC = Least Concern



## APPENDIX H – Faunal SCC

**Table H1: RDL Mammal Species for the Gauteng Province (GDARD 2014).**

Scientific Name	Common name	IUCN Status	GDARD Status
<i>Neamblysomus julianae</i>	Juliana's Golden Mole	EN	VU
<i>Mystromys albicaudatus</i>	White-tailed Mouse	EN	EN
<i>Atelerix frontalis</i>	Southern African Hedgehog	LC	NT
<i>Lutra maculicollis</i>	Spotted-necked Otter	NT	NT
<i>Miniopterus schreibersii</i>	Scheiber's Long-Fingered Bat	NT	NT
<i>Myotis tricolor</i>	Temminck's Hairy Bat	LC	NT
<i>Rhinolophus blasii</i>	Blasius's/Peak-Saddle Horseshoe Bat	LC	VU
<i>Rhinolophus clivosus</i>	Horseshoe Bat	LC	NT
<i>Rhinolophus darlingi</i>	Darling's Horseshoe Bat	LC	NT
<i>Rhinolophus hildebrandtii</i>	Hildebrandt's Horseshoe Bat	LC	NT

VU = Vulnerable, EN = Endangered, NT = Near Threatened, LC = Least Concern

**Table H2: RDL Avifaunal Species for the Gauteng Province (GDARD 2014).**

Scientific Name	Common name	IUCN Status	Regional Status	GDARD Status
<i>Gyps coprotheres</i>	Cape Vulture	EN	EN	VU
<i>Anthropoides paradiseus</i>	Blue Crane	VU	NT	VU
<i>Falco naumanni</i>	Lesser Kestrel	LC	Ad mon	-
<i>Tyto capensis</i>	African Grass-Owl	LC	VU	VU
<i>Circus ranivorus</i>	African Marsh-Harrier	LC	EN	VU
<i>Gorsachius leuconotus</i>	White-backed Night Heron	LC	VU	VU
<i>Eupodotis senegalensis</i>	White-bellied Korhaan	LC	VU	VU
<i>Podica senegalensis</i>	African Finfoot	LC	VU	VU
<i>Mirafrja cheniana</i>	Melodious Lark	NT	End and N-end	NT
<i>Sagittarius serpentarius</i>	Secretary bird	VU	VU	NT
<i>Ciconia nigra</i>	Black Stork	LC	VU	-
<i>Eupodotis caerulescens</i>	Blue Korhaan	NT	End and N-end	NT
<i>Polemaetus bellicosus</i>	Martial Eagle	VU	EN	-
<i>Phoenicopterus minor</i>	Lesser Flamingo	NT	NT	-
<i>Phoenicopterus roseus</i>	Greater Flamingo	LC	NT	-
<i>Alcedo semitorquata</i>	Half-collared Kingfisher	LC	NT	NT

VU = Vulnerable, NT = Near Threatened, LC = Least Concern, EN = Endangered, Ad mon = Additional Monitoring, End and N-end = Endemic and Near endemic



**Table H3: RDL Invertebrates Species for the Gauteng Province (GDARD 2014)**

Scientific Name	Common name	IUCN Status	GDARD Status
<i>Lepidochrysops praeterita</i>	Highveld Blue Butterfly	NYBA	VU
<i>Chrysothrix aureus</i>	Heidelberg Copper	NYBA	VU
<i>Ichneustoma stobbiai</i>	Stobbia's Fruit Chafer Beetle	NYBA	VU
<i>Aloeides dentatis</i>	Roodepoort Copper Butterfly	NYBA	VU

VU = Vulnerable, NYBA = Not yet been assessed

**Table H4: RDL Reptile Species for the Gauteng Province (GDARD 2014)**

Scientific Name	Common name	IUCN Status	GDARD Status
<i>Homoroselaps dorsalis</i>	Striped Harlequin Snake	NT	NT

NT = Near Threatened

**Avifaunal Species for the pentads 2555\_2810 and 2600\_2810 within the QDS 2528CC and 2628AA respectively.**

[http://sabap2.adu.org.za/pentad\\_info.php?pentad=2555\\_2810&section=species](http://sabap2.adu.org.za/pentad_info.php?pentad=2555_2810&section=species)

[http://sabap2.adu.org.za/pentad\\_info.php?pentad=2600\\_2810&section=species](http://sabap2.adu.org.za/pentad_info.php?pentad=2600_2810&section=species)



## APPENDIX I – Specialist information

### DETAILS, EXPERTISE AND CURRICULUM VITAE OF SPECIALISTS

#### 1. (a) (i) Details of the specialist who prepared the report

N. Cloete	MSc (Environmental Management) (University of Johannesburg)
Chris Hooton	BTech Nature Conservation (Tshwane University of Technology)
Marelle Meintjies	MSc (Medicinal Plant Science) (University of Pretoria)

#### 1. (a). (ii) The expertise of that specialist to compile a specialist report including a curriculum vitae

Company of Specialist:	Scientific Aquatic Services		
Name / Contact person:	Nelanie Cloete		
Postal address:	29 Arterial Road West, Oriel, Bedfordview		
Postal code:	2007	Cell:	084 311 4878
Telephone:	011 616 7893	Fax:	011 615 6240/ 086 724 3132
E-mail:	nelanie@sasenvgroup.co.za		
Qualifications	MSc Environmental Management (University of Johannesburg) MSc Botany (University of Johannesburg) BSc (Hons) Botany (University of Johannesburg) BSc (Botany and Zoology) (Rand Afrikaans University)		
Registration / Associations	Professional member of the South African Council for Natural Scientific Professions (SACNASP) Member of the South African Association of Botanists (SAAB) Member of the International Affiliation for Impact Assessments (IAIAsa) South Africa group Member of the Grassland Society of South Africa (GSSA) Member of the Botanical Society of South Africa (BotSoc)		





## SCIENTIFIC AQUATIC SERVICES (SAS) – SPECIALIST CONSULTANT INFORMATION

### CURRICULUM VITAE OF NELANIE CLOETE

#### PERSONAL DETAILS

Position in Company	Senior Scientist Botanical Science and Terrestrial Ecology
Date of Birth	6 October 1983
Nationality	South African
Languages	English, Afrikaans
Joined SAS Group of Companies	2011

#### MEMBERSHIP IN PROFESSIONAL SOCIETIES

Professional member of the South African Council for Natural Scientific Professions (SACNASP)  
 Member of the South African Association of Botanists (SAAB)  
 Member of the International Affiliation for Impact Assessments (IAIAsa) South Africa group  
 Member of the Grassland Society of South Africa (GSSA)  
 Member of the Botanical Society of South Africa (BotSoc)

#### EDUCATION

##### Qualifications

MSc Environmental Management (University of Johannesburg)	2013
MSc Botany (University of Johannesburg)	2007
BSc (Hons) Botany (University of Johannesburg)	2005
BSc (Botany and Zoology) (Rand Afrikaans University)	2004

##### Short Courses

Certificate – Department of Environmental Science in Legal context of Environmental Management, Compliance and Enforcement (UNISA)	2009
Introduction to Project Management - Online course by the University of Adelaide	2016

#### COUNTRIES OF WORK EXPERIENCE

**South Africa** – Gauteng, Mpumalanga, North West, Limpopo, KwaZulu-Natal, Northern Cape, Eastern Cape, Free State  
**Africa** - Democratic Republic of the Congo (DRC)

#### SELECTED PROJECT EXAMPLES

##### Floral Assessments

- Floral assessment as part of the environmental assessment and authorisation process for the proposed Mzimvubu water project at Maclear, Eastern Cape.
- Floral assessment as part of the environmental authorisation process for the proposed Assmang Iron Ore Black Rock, Northern Cape Province.
- Floral assessment as part of the environmental authorisation process for the proposed Bloemwater Knellpoort water project pipeline assessment, Free State Province.
- Terrestrial ecological scan as part of the environmental authorisation process for the proposed Sappi Pipeline, Gauteng.
- Floral assessment as part of the proposed Setlagole Mall development, North West Province.
- Floral assessment as part of the coastal habitat changes in the Brand-se Baai area, Western Cape.





**Environmental and Ecological Management Plans**

- Biodiversity Action plans for African Exploration, Mining and Finance Corporation in line with the NEMBA requirements.
- Biodiversity Action plans for Twickenham Platinum mining operations in line with the NEMBA requirements, Limpopo Province.
- Biodiversity Action plans for Bokoni Platinum mining operations in line with the NEMBA requirements, Limpopo Province.
- Maintenance and Management Plan for the Gamagara River, Northern Cape.
- Development of the Limpopo Province Environmental Outlook Report.

**Permit applications for protected tree and floral species**

- Permit application for the removal of protected tree species for the Bushbuckridge Shopping Mall development within the Mpumalanga Province.
- Permit application for the removal and propagation of protected tree species for the Open Cast Operations within Bokoni Platinum Mine in the Limpopo Province.
- Permit application for the removal of protected tree species for Modikwa Mine within the Limpopo Province.
- Permit application for the removal of protected tree species for the Umfolozi Power line within the Kwa-Zulu Natal Province.
- Permit application for the removal of protected tree species for the expansion activities at Black Rock Mining Operations, Northern Cape Province.
- Permit application for the removal of protected tree species for the expansion activities at Assmang Dwars Rivier Mine, Limpopo Province.





**SCIENTIFIC AQUATIC SERVICES (SAS) – SPECIALIST CONSULTANT  
INFORMATION  
CURRICULUM VITAE OF CHRISTOPHER HOOTON**

**PERSONAL DETAILS**

Position in Company	Ecologist
Date of Birth	24 June 1986
Nationality	South African
Languages	English, Afrikaans
Joined STS	2013

**EDUCATION**

**Qualifications**

BTech Nature Conservation (Tshwane University of Technology)	2013
National Diploma Nature Conservation (Tshwane University of Technology)	2008

**COUNTRIES OF WORK EXPERIENCE**

South Africa – Gauteng, Mpumalanga, North West, Limpopo, KwaZulu-Natal, Eastern Cape, Western Cape, Northern Cape, Freestate  
Zimbabwe

**SELECTED PROJECT EXAMPLES**

**Faunal Assessments**

- Faunal assessment as part of the environmental assessment and authorisation process for the proposed Mzimvubu Water Project, Eastern Cape.
- Faunal assessment as part of the environmental assessment and authorisation process for the proposed Setlagole Mall Development, North West.
- Faunal assessment as part of the environmental assessment and authorisation process for the proposed Expansion and Upgrade of the Springlake Railway Siding, Hattingspruit, Kwa-Zulu Natal.
- Faunal assessment as part of the environmental assessment and authorisation process for the proposed Styldrift tailings storage facility, return water dams, topsoil stockpile and other associated infrastructure, North West.
- Faunal assessment as part of the environmental assessment and authorisation process for the development of a proposed abalone farm, Brand se Baai, Western Cape.
- Faunal assessment as part of the environmental assessment and authorisation process for the development of a proposed abalone farm, Doringbaai, Western Cape.
- Vegetation composition and subsequent loss of carrying capacity for the Rand Water B19 and VG Residue Pipeline Project, Freestate.
- Faunal assessment as part of the environmental assessment and authorisation process for the Evander Shaft 6 Plant Upgrade, New Tailings Dam Area and Associated Tailings Delivery and Return Water Pipeline, Evander, Mpumalanga.

**Previous Work Experience**

- Spotted Hyaena Research Project, Phinda Private Game Reserve, KwaZulu Natal.
- Camera Trap Survey as part of the Munyawana Leopard Project, Mkuze Game Reserve, KwaZulu Natal.
- Lowveld Wild Dog Project, Savé Valley Conservancy, Zimbabwe.
- Lion collaring and Tracking as part lion management program, Savé Valley Conservancy, Zimbabwe.
- Junior Nature Conservator, Gauteng Department of Rural Development and Land Reform.





**SCIENTIFIC AQUATIC SERVICES (SAS) – SPECIALIST CONSULTANT  
INFORMATION  
CURRICULUM VITAE OF MARELIE MEINTJIES**

### **PERSONAL DETAILS**

Position in Company	Junior Field Biologist
Date of Birth	8 July 1986
Nationality	South African
Languages	English, Afrikaans
Joined SAS	April 2015

### **EDUCATION**

#### **Qualifications**

MSc Medicinal Plant Science (University of Pretoria)	2014
BSc (Hons) Medicinal Plant Science (University of Pretoria)	2012
BSc Biotechnology (University of Pretoria)	2011

### **COUNTRIES OF WORK EXPERIENCE**

South Africa – Gauteng, Mpumalanga, Free State, Northern Cape, Western Cape

### **SELECTED PROJECT EXAMPLES**

#### **Terrestrial Assessments**

- Floral Ecological Assessment as part of the Environmental Assessment and Authorisation Process for the proposed Leslie 2 underground coal mining operation, Gauteng Province.
- Floral Ecological Assessment as part of the Environmental Assessment and Authorisation Process for the proposed development of Zwavelpoort 373-JR Portions 116 and 130, Pretoria, Gauteng Province
- Floral Ecological assessment for the Jeannette Expansion Project at the Taung Gold International Mine near Welkom, Free State Province.
- Terrestrial Sensitivity Scan as part of the Environmental Authorisation Process for the proposed Sagewood Ext 17 development within the Summerset Area, Gauteng
- Terrestrial Sensitivity Scan as part of the Environmental Authorisation Process for the proposed Kyalami X4 development, Midrand, Gauteng Province
- Terrestrial Ecological Sensitivity Scan as part of the Environmental Assessment and Authorisation Process for the proposed development on erf 199, Witfield, Boksburg, Gauteng Province
- Terrestrial Ecological Scan as part of the Environmental Authorisation Process for the proposed development of Witfontein Ext 87, Gauteng province
- Terrestrial Sensitivity Scan as part of the environmental impact assessment and authorisation process for the proposed development of a pipeline in Kriel, Mpumalanga Province.

#### **Wetland Assessments**

- Riparian Zone Ecological Assessment as well as a Riparian Rehabilitation and Management Plan for the proposed maintenance activities associated with the LC de Villiers Sports Campus of the University of Pretoria, Gauteng Province.
- Wetland Ecological Assessment as part of the Environmental Assessment and Authorisation Process for the Proposed Expansion of the Cambrian Cemetery, Gauteng Province
- Wetland Ecological Assessment as part of the Environmental Assessment and Authorisation Process for the Proposed Expansion of the Kromvlei Cemetery, Gauteng Province



**Wetland Rehabilitation and Monitoring Plans**

- Wetland Rehabilitation and Management Plan for the wall construction within the Riversands Estate, Midrand, Gauteng Province
- Freshwater Resource Rehabilitation and Management Plan as part of the Water Use Authorisation for the Proposed Belhar Potable Water Pipeline over the Kuils River, Western Cape Province
- Wetland Rehabilitation and Management Plan for the wetland and open space area associated with the Carlswald Valley Residential Development, City of Johannesburg, Gauteng Province.
- Wetland Rehabilitation and Management Plan for the wetland resource within the Carlswald Valley Residential Development, Kyalami, Gauteng Province

**Desktop Ecological Assessments**

- Aquatic and Wetland Scoping Assessment as part of the Environmental Assessment and Authorisation Process for the Proposed Witfontein Mining Project, near Bethal, Mpumalanga Province
- Freshwater Resource Scoping Assessment as part of the Environmental Assessment and Authorisation Process for the Proposed Photovoltaic Solar Energy Facility on the Heuningklip Farm near Vredenburg, Western Cape Province
- Desktop Ecological Assessment and Site Sensitivity Report as part of the Environmental Assessment and Authorisation Process prior to Prospecting Activities on the Farm Zeekoebaart 306 Rd, Postmasburg, Northern Cape Province
- Desktop Ecological Assessment as part of the environmental assessment and authorisation process for the Genet Manganese (Pty) Ltd prospecting area on the farm Lemoenkloof No 456, Northern Cape Province.

**Screening Assessment**

- Desktop Ecological Assessment and Field Verification Report as part of the Screening Assessment for the Proposed Soweto Power Park Ext 3, Gauteng Province

**Water Use Applications**

- General Authorisation Application Process to obtain authorisation from the Department of Water and Sanitation for the water uses related to the proposed road upgrades associated with the Pearl Valley Phase II Development, Paarl, Western Cape Province

**Miscellaneous Projects**

- Desktop Ecological Assessment and Site Sensitivity Report as part of the Elikhulu TSF Facility site selection process, Evander, Mpumalanga Province
- Ecological Screening Assessment, Ground Truthing and Site Sensitivity Report for the Proposed Tubatse SEZ. Steelpoort, Limpopo Province
- Identification of Important Medicinal Plant Species to be rescued and relocated as part of the Rescue and Relocation Plan for the area earmarked for surface infrastructure at the Yzermyn Colliery near Dirkiesdorp, Mpumalanga
- Biodiversity Survey for the BMW Group South Africa at the Rosslyn Manufacturing Plant, Rosslyn, Gauteng Province
- Biodiversity and Ecosystem Health for Limpopo Province, South Africa Thematic Chapter as part of Limpopo Environmental Outlook Report
- Literature Review and Initial Assessment on the control of Alien and Invasive Plants associated with aquatic environments within the City of Johannesburg



**1. (b) a declaration that the specialist is independent in a form as may be specified by the competent authority**

I, Nelanie Cloete, declare that -

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct



-----  
Signature of the Specialist





## Appendix H: EMPr



# INFORMATION DECISION SYSTEMS

Geographical Information Systems & Environmental Consulting Services

## DRAFT ENVIRONMENTAL MANAGEMENT PLAN MASHIMONG PARK, WARD 5, EKURHULENI

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## **EXECUTIVE SUMMARY**

The Mashimong Park Environmental Management Plan (EMP) is developed to assist City of Ekurhuleni with the proposed development activities to be undertaken on site by providing guidance and planning entities for the proposed activities with minimal environmental impacts.

Mashimong Park is situated within the Tembisa Township within the City of Ekurhuleni (COE). COE Metroparks has identified the need to develop the park, to a green modern look that accommodates visitors of all classes and promote business development to the community.

This EMP is recognised as the tool that can provide the assurance that the project proponent has made suitable provisions for mitigation as well as providing a description of the methods and procedures for mitigating and monitoring impacts.

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## GLOSSARY OF TERMS

<b>TERM</b>	<b>DESCRIPTION</b>
<b>Client</b>	The City of Ekurhuleni is regarded as the Client.
<b>Contractor</b>	Construction companies are appointed on behalf of the client to undertake the construction activities, as well as their subcontractors and suppliers.
<b>Environment</b>	The environment means the surroundings within which humans exist and that could be made up of water, air, soil, sand, plants and animals.
<b>Environmental Aspect</b>	An environmental aspect is any component of a contractor's construction activity that is likely to interact with and on the environment.
<b>Environmental Impact</b>	An impact or environmental impact is the change to the environment, whether desirable or undesirable, that will result from the effect of a construction activity. An impact may be the direct or indirect consequence of a construction activity.
<b>Environmental Consultant</b>	An independent consultant that is appointed by the client to compile an Environmental Management Plan and undertake environmental audits.
<b>Environmental Control Officer</b>	A qualified person nominated by the appointed contractor and/or client who will ensure the day-to-day implementation of the EMP by contractors.
<b>General Waste</b>	Domestic waste, commercial waste, non-hazardous industrial waste and builders' rubble e.g. paper, plastics, food, tins, wood, etc.
<b>Hazardous Substance</b>	Any substance that poses a significant risk to health and safety, property or the environment. These substances have been classified under the SABS Code 0228: 'The Identification and Classification of Dangerous Goods and Substances'.
<b>Hazardous Waste</b>	Any inorganic or organic element or compound that because of its toxicological, physical, Chemical or persisting properties, may exercise detrimental acute or chronic impacts on human health or development. Hazardous wastes are classified in accordance with the 'Minimum Requirement for the Handling, Classification and Disposal of Hazardous Waste' published by the Department of Water Affairs and Forestry (1998).
<b>Hazardous Waste Landfill Site</b>	A waste disposal site that is designed managed and permitted to allow for the disposal of hazardous waste substances. These sites are permitted by the Department of Water Affairs and Forestry.
<b>Incident</b>	The occurrence of a pollution event that will have a direct or indirect effect on surface water, Groundwater and the associated plants and animals.
<b>Social Environment</b>	Persons likely to be directly or indirectly affected by the project construction activities.
<b>Topsoil</b>	The layer of soil covering the earth which provides a sustainable environment for the germination of seeds, allows water penetration, and is a source of micro-organisms and plant nutrients.
<b>Watercourse</b>	A natural channel in which water flows regularly or intermittently.
<b>Waste</b>	An unusable or unwanted substance or material, such as a waste product.
<b>Workforce</b>	The entire project team including people employed by the Client or the Contractor, persons involved in activities related to the project, or persons present at or visiting the construction area, including permanent contractors and casual labour

## TERMS AND ABBREVIATIONS

Abbreviation	Term
IDS	Information Decision Systems
EMP	Environmental Management Plan
EIA	Environmental Impact Assessment
ECO	Environmental Control Officer
I&AP	Interested & Affected Parties
NEMA	National Environmental Management Act
GDARD	Gauteng Department of Agriculture and Rural Development

# 1 INTRODUCTION

Information Decision Systems (IDS) has, on behalf of City of Ekurhuleni, prepared the Environmental Management Plan (EMP) for the development of the Mashimong Park. This site-specific EMP details permissible and non-permissible activities during the construction and operational phases of the said project.

## 2 SCOPE OF EMP

In accordance with the requirements of the NEMA Environmental Impact Assessment (EIA) Regulations, dated December 2014, and the requirements of the Gauteng Department of Agriculture and Rural Development (GDARD), this EMP is to be implemented by the Applicant as well as any employee, contractor, agent or sub-contractor appointed to act on behalf of the Applicant in the execution of the project, in order to ensure environmental compliance on site.

The specifications outlined in this EMP are thus applicable to all activities undertaken by the Applicant as well as appointed contractors and all persons involved in the execution of the works including sub-contractors, the workforce, suppliers and volunteers for the duration of construction, operation and future maintenance.

An Environmental Code of Conduct (Appendix 1) has also been developed that provides a simplified set of rules that should be adhered to by all persons involved with the project at all times. This is to be displayed at strategic points where it will invoke constant environmental awareness.

### 2.1 Objectives of the EMP

The objective of this document is to:

- Encourage good management practices through planning and commitment to environmental issues;
- Define how the management of activities and their impact on the environment is reported and performance evaluated;
- Provide rational and practical environmental conditions / requirements to:
  - Minimise disturbance of the natural environment;
  - Ensure water resource protection;
  - Prevent or minimise all forms of pollution;
  - Protect indigenous flora and fauna;
  - Prevent soil and sand erosion and facilitate the re-vegetation of affected areas;
  - Maintenance of newly re-vegetated areas;
  - Restrict noise disturbance

- Ensure compliance with all applicable laws, regulations, standards and guidelines for the protection of the environment; and
- Adopt the best practical means available to prevent or minimise adverse environmental impacts.
- Develop waste management practices based on prevention, minimisation, recycling, treatment or disposal of waste;
- Describe all monitoring procedures required to identify impacts on the environment; and
- Train the Applicant, its employees and contractors with regard to their environmental obligations.

It should be noted that this EMP is a dynamic document that should be continually updated, as and when required. Any amendments made must be submitted to GDARD Monitoring, Compliance and Enforcement sub-directorate prior to implementation.

### 3 MASHIMONG PARK

#### 3.1 Locality

The site is located in Tembisa Ward 6 within the City of Ekurhuleni, Gauteng Province. The location is presented by the geographic locations defined in table 1 below:

Table 1: Geographical Location

Coordinates	
Latitude	25°59'52.29"S
Longitude	28° 14'15.10"E

### 4 DEVELOPMENT OF MASHIMONG PARK

#### 4.1 Development Objectives

The proposed development of Mashimong Park will constitute of the following scope of work;

- Caretakers house / Guard house
- Ablutions
- Storm water drainage;
- Skateboard park
- BMX / Fitness track;
- Gazebo / Lapa
- Lighting.
- Fencing
- Outdoor furniture
- Amphitheatre
- Modern Gym and Play equipment
- Botanic Garden
- Lapa/s
- Braai/ picnic area



## **4.2 Phases of the project**

The process which was followed in compiling this EMP is in compliance with NEMA EIA Regulations

2014, as amended in 2017 and applies the principles of Integrated Environmental Management (IEM) for Gauteng. The purpose of this EMP is to formulate mitigation measures that are made binding on all contractors during the planning, construction phase as well as during the operational phase.

The starting point for this EMP is to take a pro-active route by addressing potential problems before they occur. This limits corrective measures needed during the construction, post construction and operational phases of the development. Additional mitigation will be included throughout the project's various phases as required and if necessary.

This EMP deals with the following phases as detailed below;

### **Planning Phase**

The planning phase typically includes investigative activities such as confirmation of materials availability, archaeological site protection and rescue, location identification of the site camp and notification of affected communities.

### **Site Establishment**

This phase includes the development of the temporary construction camp whereby the mitigation measures and potential impacts discussed on the planning phase are implemented while ensuring environmental sustainability.

### **The Construction Phase**

Majority of the impacts during this phase will have immediate effects (e.g. noise, dust and water pollution). Adequate monitoring of the site on a continual basis during the construction phase assists in identifying these impacts as they occur. These impacts can then be mitigated through the contingency plans to be discussed on this document, together with a commitment to sound environmental management from Information Decision Systems.

### **Post Construction**

This phase marks the completion of the construction phase of the project whereby the site is to be prepared for rehabilitation where necessary to limit any negative environmental impacts that might occur on the operational phase.

### The Operational Phase

Taking pro-active measures during the planning and construction phases, potential environmental impacts emanating during the operational phase will be minimised. This, in turn, will minimise the risk and reduce the monitoring effort, but it does not make monitoring obsolete.

## 5 ORGANIZATIONAL STRUCTURE AND RESPONSIBILITY AND MANAGEMENT

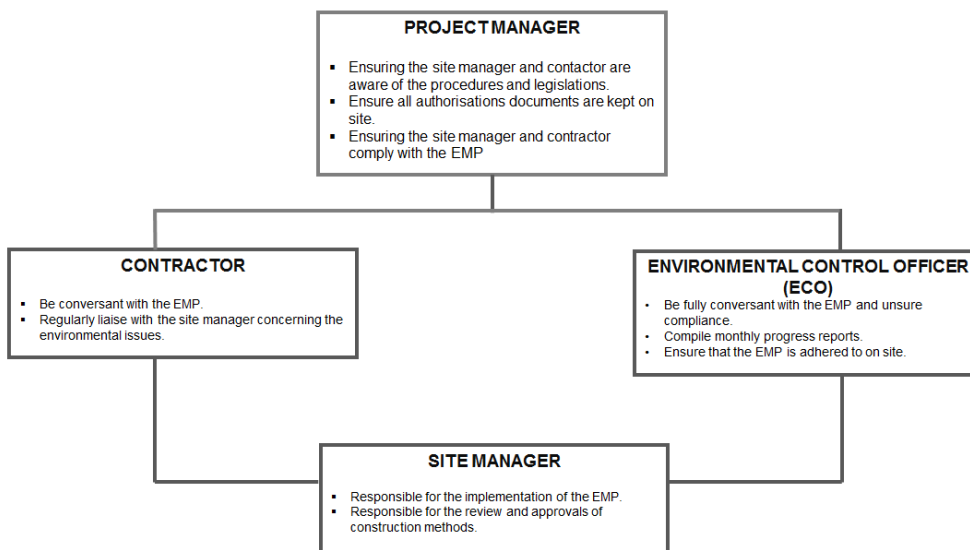


Figure 1: Organizational Structure

### 5.1 Responsibility

This section indicates the party responsible for implementing the environmental measures and action plans laid out in the EMP. Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Project Proponent, Project Manager, Site Manager/Engineer, Contractor/Operator and Environmental Control Officer are as detailed below.

#### The Project Proponent / Project Manager

- Should ensure that the Site Manager/Engineer and the Contractor/Operator are aware of all specifications, legal constraints, standards and procedures pertaining to the project specifically with regard to the environment;
- Should ensure that a copy of the Environmental Management Plan, Environmental Authorization as well as the Water Use Licence issued by the Department of Water Affairs be kept at the site camp office at all times,
- Ensure that all stipulations within the EMP are communicated and adhered to by the Site Manager/Engineer and the Contractor/Operator;
- Should monitor the implementation of the EMP throughout the project by means of regular site visits and meetings; and
- Must order the removal of any person(s) and/or equipment in contravention of the specifications of the EMP.

The Project Manager should and must be fully conversant with the EMP for the project, as well as all applicable environmental legislation.

#### **The Site Manager/ Engineer**

- Must be fully conversant with the EMP;
- Should be fully conversant with all environmental legislations and ensure compliance;
- Should have overall responsibility for the implementation of the EMP;
- Must liaise with the Project Manager and Contractor/Operator on matters concerning the environment;
- Prevent actions that will harm or may cause harm to the environment, and take steps to prevent pollution of the site;
- Implement remedial measures in the event of pollution incidents or environmental impacts;
- Should monitor and verify that environmental impacts are kept to a minimum;
- Review and approve construction methods where necessary; and
- Order the removal of any person(s) and/or equipment in contravention of the specifications of the EMP.

#### **The Contractor**

- Must be fully conversant with the EMP;
- Must be fully conversant with all environmental legislation and ensure compliance;
- Should ensure that all the environmental specifications contained within this EMP are adhered to at the site;
- Regularly liaise with the Site Manager on matters relating to the environment; and
- Confine activities to the demarcated construction site.

The above responsibilities listed for the Contractor will also apply to any appointed sub consultants.

#### **The Environmental Control Officer (ECO)**

- Must be fully conversant with the EMP;
- Must be fully conversant with all environmental legislation and ensure compliance;

- Ensure that all the environmental specifications contained within this EMP are adhered to at the site;
- Regularly liaise with the Site Manager on matters relating to the environment; and
- Will compile monthly reports as to the progress of the construction phases and report to all parties involved (Site Manager, Project Proponent).

## **5.2 Environmental Awareness**

### **Environmental Induction Training**

The main objective of the Environmental induction training is to ensure that all personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and ongoing minimization of environmental harm.

To meet the above vision or aim, it is vital that employees, Contractors and Subcontractors are aware of the responsibilities in terms of the relevant environmental legislation (National Environmental Management Act: Act 107 of 1998) and the contents of this EMP. This environmental training includes the following:

- Providing basic understanding of the key environmental features of the construction site and the surrounding environment;
- Ensure that employees are familiar with the requirements of the EMP and the environmental specifications as they apply to the construction of the power station.
- Providing Basic training in the identification of archaeological artefacts, and rare and endangered flora and fauna that may be encountered on the site.
- Ensure awareness of any other environmental matters, which are deemed to be necessary by the ECO.
- Highlight the importance of record keeping for complaints and incidences that occur on site.

Training should be conducted in both in a written or verbal format and in an appropriate language that accommodates the audience.

## **5.3 Monitoring Programme**

The monitoring programme aims at ensuring conformance with the EMP and to monitor any environmental issues and impacts which have not been accounted for in the EMP and could result in significant environmental impacts for which corrective action is required.

The appointed ECO incorporation with COE should stipulate the period and frequency of monitoring required as per environmental issues on site in terms of sensitivity and priority. This will be determined in consultation with relevant stakeholders and authorities. The Project Manager should ensure that the monitoring is carried out.

In addition to the stipulation of the frequency of monitoring, the ECO should ensure compliance with the EMP and conduct the monitoring activities. The Environmental Control Officer must have the appropriate experience and qualifications to undertake the necessary tasks. As part of the monitoring programme, the Environmental Control Officer must report to the Site Manager should any non-compliance be evident or corrective action necessary.

It is important to ensure that all instruments and devices used for the measurement or monitoring of any aspect of this EMP must be calibrated and appropriately operated and maintained.

#### **5.4 Site inspections and Reporting**

The appointed ECO will be responsible for;

- Inspecting the site on a stipulated period to ensure that environmental specifications are adhered to.
- Compiling a written monthly audit report, detailing both compliance with the Environmental Specification as well as environmental performance .The Environmental and Compliance Report will be made available to the competent authorities.
- Maintaining a record of major incidents as well as corrective and preventive actions taken

#### **5.5 Documentation**

The following documentation must be kept on site by the Site Manager in order to record compliance with the EMP:

- Record of Complaints;
- Monitoring Results;
- Notification of Emergencies and Incidents; and
- Any other documentation as required by the Record of Decision.



In addition, the Site Manager should:

- Maintain records to demonstrate compliance to the Environmental Specifications; and Environmental Method Statements. The Contractor shall ensure that all records of spills, pollution incidents, spot fines, training details, etc. are copied to the ECO for his/her records.
- All documents shall be open for inspection by the ECO.

## **5.6 Compliance with Legislative Documents: Environmental Authorisations**

- The EMP will be available on-site at all times.
- All employees on-site will abide by the requirements of the EMP following successful completion of the environmental induction training.
- Any members of the construction workforce found to be in breach of any of the specifications contained within the EMP will be ordered by the Project Manager to leave the site. The order must be given orally or in writing.
- The Contractor will not direct a person to undertake any activity which would place them in contravention of the specifications contained within the EMP.
- Should the Contractor be in breach of any of the specifications contained in the EMP, the Project Manager will, in writing, instruct the Contractor responsible for the incident of non-compliance regarding corrective and/or remedial action required, specify a timeframe for implementation of these actions, implement a penalty and/or indicate that work will be suspended should non-compliance continue.
- The Environmental Monitoring Committee (EMC) must report to the Compliance Unit of the Gauteng Department of Agriculture and Rural Development on a monthly basis, in so far as project compliance to the condition of this Record of Decision, environmental legislation and specific mitigation requirements as stipulated in the Basic Assessment Report (BAR) and the Environmental Management Plans is concerned.
- The applicant must notify GDARD, in writing, within 24 hours thereof if any condition of the ROD authorisation cannot, or is not, adhered to. The notification must be supplemented with reasons for non-compliance.
- Departmental officials will be given access to the property referred to in the ROD authorisation for the purpose of assessing and/or monitoring compliance with the conditions contained in the ROD, at all reasonable times.
- Records relating to monitoring and auditing must be made available for inspection to any relevant authority in respect of this development.
- The GDARD reserves the right to monitor and audit the development throughout its full lifecycle to ensure that it complies with the RoD conditions, as well as mitigation measures in the final Basic Basement Report (BAR), and the construction EMP.

## **5.7 Environmental Incident and Complaints Register**

The Contractor will report environmental incidents and complaints involving Contractor employees and/or the public:

- Report environmental incidents involving Contractor employees and/or the public
- Report environmental complaints and correspondence received from the public to the Project Manager or the Environmental Control Officer.
- Record and report incidents that cause harm or may cause harm to the environment to the Environmental Control Officer.
- Record all hazardous materials used on site.
- Maintain a record of all Hazardous Waste Disposal Manifests detailing the nature of the hazardous waste disposed of, the hazardous waste classification and the location of the site to which such waste was sent.
- The above records will form an integral part of the Contractors' Records. These records will be kept with the EMP, and will be made available for scrutiny if so requested by the Project Manager or his delegate and the Environmental Control Officer.
- The Environmental Control Officer will put in place an Environmental Register to document:
  - All environmental complaints and correspondence received from the public, or the construction workforce.
  - Register incidences of non-compliances with the EMP.
  - Any other environmental incidents related to the construction phase of the project.
  - The Environmental Control Officer will ensure that the following information is recorded for all which includes;
    - complaints/incidents:
    - Causes of complaint/incident.
    - Parties responsible for causing complaint/incident.
    - Actions undertaken to stop/reduce/contain the causes of the complaint/incident.
    - Additional corrective or remedial actions taken and/or to be taken to address and to prevent reoccurrence of the complaint/incident.
    - Timeframes and the parties responsible for the implementation of the corrective or remedial actions.

## 6 ENVIRONMENTAL MANAGEMENT PLAN

The following table forms the core of this EMP for the construction, post construction and operational phases of the development. This table should be used as a checklist on site, especially during the construction phase. Compliance with this EMP must be audited monthly during the construction phase and once immediately following completion of construction. This must be followed up with annual audits for a period of two years during the operational phase

Below is a schematic diagram of the development of the Mashimong Park Environmental Management Plan phases and the color codes used to clearly define the phases as well as the categories used to define the Environmental Management Plan.

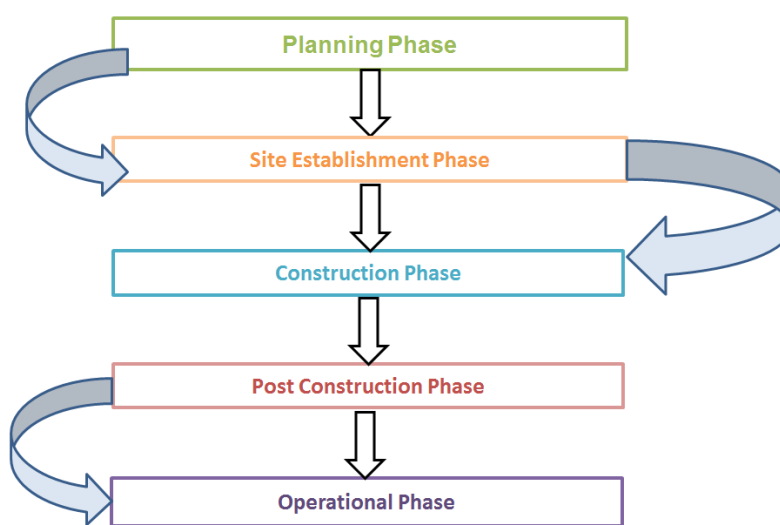


Figure 2: Phases of Mashimong Parks Development EMP

Item	Description
Issues	Environmental issues are defined as problems with the planet's systems (air, water, soil, etc.) that have developed as a result of the proposed or existing development.
Mitigation Measures	means the elimination, reduction or control of the adverse environmental impact of the project
Performance Indicator	A type of an indicator that assist with evaluating the success of the mitigation measures
Responsibility	Is the person responsible for ensuring effective implementation of the mitigation measures.
Significance Rating	Significance of the impacts is determined by evaluating the cumulative impact of nature, extent, duration, intensity and probability. <b>Low</b> - where it will not have a significant impact on the environment. <b>Medium</b> -where it will have a medium significance on the environment. <b>High</b> - where it will have a high significance on the environment.

Table 2: Categories used to define the EMP

ISSUES	MITIGATION MEASURES	PERFORMANCE INDICATOR	RATING	RESPONSIBILITY
<b>TECHNICAL DESIGN</b>				
Surface drainage and natural hydrological regimes	<ul style="list-style-type: none"> <li>Meadow drains should not drain directly into streams.</li> <li>Side or v-drains should be lined or at least have rows of rocks (bolsters) to slow water flow</li> </ul>	Lining on the drains	Medium	Engineer
Stormwater drainage	<ul style="list-style-type: none"> <li>Avoid concentrating flows and address head cut erosion.</li> <li>Protection of wetlands from concentrated water run off</li> </ul>	Erosion on streams	High	Engineer
<b>LIAISON WITH AFFECTED PARTIES</b>				
Notification	<ul style="list-style-type: none"> <li>Ensure that the necessary liaison with landowners, land users, community leaders, service providers and other affected parties has taken place prior to construction and where required, the relevant consent obtained</li> </ul>	Consent documentation and proof of clarification meeting if any.	Low	Engineer
<b>NO-GO AREAS</b>				
	<ul style="list-style-type: none"> <li>No- go areas should be agreed to in consultation between the ECO, main consultant and Applicant prior to construction</li> <li>In accordance, in areas where no repair activities are planned, the stream and associated vegetation must be treated as a potential 'No-Go Area'; meaning that negative impacts on the environment must be mitigated wherever possible and therefore no unnecessary construction activities must occur in the stream.</li> <li>Unauthorized entry, stockpiling, dumping or storage of equipment, material or waste should be strictly prohibited in identified no go areas.</li> </ul>	Identified No-go Areas and areas well known to the rest of the contractual staff.	Medium	Engineer, ECO and Site Manager and Contractor

Table 3: Planning Phase of Mashimong Parks Development EMP

Table 4: Site Establishment of Mashimong Parks Development EMP

ISSUES	MITIGATION MEASURES	PERFORMANCE INDICATOR	RATING	RESPONSIBILITY
<b>SITE LAYOUT</b>				
Site Camp	<ul style="list-style-type: none"> <li>Limit the size of the site to a minimum</li> </ul>	<p>The Site camp should be comprised of but not limited to ;</p> <ul style="list-style-type: none"> <li>site office;</li> <li>ablution facilities;</li> <li>designated first aid area;</li> <li>eating areas;</li> <li>storage areas;</li> </ul>	Low	Engineer
Storage	<ul style="list-style-type: none"> <li>Locate materials and soil stockpile areas, fuels and chemical storage areas, concrete batching areas</li> <li>locate storages away from environmentally sensitive areas and protected from stormwater runoff, fire and access by unauthorized persons</li> <li>Do not stockpile material underneath or against the trunks of trees.</li> </ul>	<p>Storages should be located away from sensitive areas and properly demarcated for storage</p>	Medium	Engineer
Access routes	<ul style="list-style-type: none"> <li>Locate and clearly indicate convenient access routes, temporary loading and parking areas and turning circles so that vehicle movement can be confined to these areas</li> <li><b>NO</b> additional roads for construction access are required</li> <li>The liberation of dust into the surrounding environment must be effectively controlled by the use of water sprays, fabric containment or curtains, where</li> </ul>	<p>Access Routes must be marked with temporary road markings to control traffic.</p>	Low	Engineer
Chemical toilets	<ul style="list-style-type: none"> <li>Toilets must be available for all site staff. Toilets should be no closer than 50m from any natural water bodies.</li> <li>Chemical toilets should be maintained in a clean state and be moved around to ensure that they adequately service the work areas at all times.</li> <li>The construction of “long drop” toilets is forbidden.</li> <li>Under no circumstances may open areas or the surrounding bush be used as a toilet facility.</li> </ul>	<p>Chemical toilets will be located at a reasonable distance from the identified watercourse.</p>	Medium	Contractor



Sanitation	<ul style="list-style-type: none"> <li>• Bins and / or skips must be provided at convenient intervals for disposal of waste along the work areas and in the construction</li> <li>• Bins should have liner bags for efficient control and safe disposal of waste.</li> <li>• Any effluent containing oil, grease or other industrial substances must be collected in a suitable containment facility and removed from the site, either for resale or for appropriate disposal at a recognized</li> </ul>	No waste will be located outside storage areas on site. All waste will be stored accordingly.	<b>Medium</b>	<i>Contractor</i>
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**FIRE CONTROL FACILITIES**

	<ul style="list-style-type: none"> <li>• Sufficient firefighting equipment should be provided at the site camp, particularly near chemicals and fuels stores, and areas where other flammable materials that maybe at risk. Fire control measures must be in accordance with the Pre- Construction Health and Safety Specification in the contract documents.</li> <li>• Contact details of local businesses and any local fire control agencies are available, in case of fire.</li> </ul>	Firefighting equipment with markings as per SABS Requirements.	<b>High</b>	<i>Contractor</i>
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**EMERGENCY PROCEDURES, EMERGENCY CONTACT NUMBERS, FIRST AID**

	<ul style="list-style-type: none"> <li>• Emergency procedures must be provided for as specified in the Pre- Construction Health and Safety Specification in the contract documents.</li> <li>• Provide all site staff with the contact details of organizations and personnel to be contacted in case of emergencies (e.g. fire, medical emergencies, chemical spills, vehicle accidents, search and rescue etc.).</li> </ul>	First Aid Box with markings of location. Emergency contacts details to be located inside the box for ease of access.	<b>Low</b>	<i>Contractor and Health and Safety Officer.</i>
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**SITE DERMACATION**

	<ul style="list-style-type: none"> <li>Clearly demarcate the perimeter of the area, as well as relevant internal areas(e.g. stockpile areas, parking areas)</li> <li>Clearly demarcate the perimeter of the area wetland to ensure contractors do not interfere with this sensitive area</li> <li>Prior to clearance, any plants that should be protected must be identified and marked so that they are not interfered with.</li> </ul>	Fencing, poles, hazard tape or other relevant marker, must be used to prevent sprawl.	Low	Contractor and ECO
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**SITE CLEARANCE**

Vegetation	<ul style="list-style-type: none"> <li>Keep removal of indigenous trees and shrubs to the minimum.</li> <li>Trim rather than fell, where possible. None may be trimmed or removed without the prior permission of the landowner and the ECO.</li> <li>Avoid clearing and excavating within the drip line (under the canopy) of large trees, as this can lead to root damage and premature death of the tree.</li> <li>When Stripping topsoil from all areas where permanent or temporary structures, or new access tracks and stockpile areas are to be established the following procedure should be followed</li> <li>200mm of topsoil must first be stripped intact with the vegetation (do not grub). This topsoil must be kept safe and protected from erosion by wind or watered covered with Hessian and not allowed to dry out completely.</li> <li>Topsoil mounds should not be higher than 1.5m. Once the camp site has been removed, the area must be ripped and the topsoil re-spread and watered. The contractor will be responsible for ensuring that a coverage of at least cover of 85% of new grass with no areas in excess of 0.04m<sup>2</sup>/m<sup>2</sup> remaining unvegetated.</li> </ul>	None	Low	Contractor, Site Engineer and ECO.
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**CONSERVATION OF TOPSOIL**

	<ul style="list-style-type: none"> <li>• Stockpile topsoil should be separated from subsoil.</li> <li>• Stockpile should only be in an area that is protected from stormwater runoff and wind.</li> <li>• Topsoil stockpiles should not exceed 2.0 m (too high 1.2-1.5m) in height and should be protected by a mulch cover where possible or covered in hessian or cloth with a minimum of 80% block.</li> <li>• Maintenance of topsoil stockpiles must be conducted in a weed free condition.</li> <li>• Topsoil should not be compacted in any way, nor should any object be placed or stockpiled upon it.</li> <li>• Stockpile topsoil for the minimum time period possible i.e. strip just before the relevant activity commences and replace as soon as it is completed.</li> <li>• Stockpiles should not be situated such that they obstruct the stream in any way.</li> <li>• Topsoil should be handled twice only - once to strip and stockpile, and secondly to replace, level, shape and scarify.</li> </ul>	Stockpile height at 2.0 m and weed free and away from a watercourse.	Medium	Contractor
<b>CONSERVATION OF WETLANDS</b>				
Planning	<ul style="list-style-type: none"> <li>• All infrastructures should be placed outside wetland areas.</li> <li>• Only permit infrastructure within the temporary boundary if it is deemed necessary.</li> <li>• Permit only essential construction personnel within the</li> </ul>	None	Medium	Contractor and Site Manager

Table 5: Construction Phase of Mashimong Parks Development EMP

ISSUES	MITIGATION MEASURES	PERFORMANCE INDICATOR	RATING	RESPONSIBILITY
<b>EARTHWORKS AND CONSTRUCTION</b>				
Earthworks	<ul style="list-style-type: none"> <li>• Earthworks should be undertaken in such a manner as to minimize the extent of any impacts caused by such activities</li> <li>• Earthworks must be completed in accordance with the scope of works and facility designs only</li> </ul>	None	Low	<i>Contractor</i>
Construction	<ul style="list-style-type: none"> <li>• Construction areas must be cordoned off and demarcated to prevent incidental public access.</li> </ul>	Construction site demarcated	Low	<i>Contractor</i>
<b>FIRE MANAGEMENT</b>				
	<ul style="list-style-type: none"> <li>• Fires should only be allowed in facilities or equipment specially constructed for this purpose at the construction camp.</li> <li>• No open fires or uncontrolled fires shall be permitted on site. Open fires for cooking/ heating purposes shall be strictly prohibited.</li> <li>• The contractor will ensure that adequate fire-fighting equipment is present on the site at all times and in good working order.</li> <li>• The workforce must be made aware of fire prevention and firefighting measures.</li> </ul>	No signs of past or present fires during the construction period.	Medium	<i>Contractor</i>
<b>SOLID WASTE MANAGEMENT</b>				

General Waste	<ul style="list-style-type: none"> <li>• The waste management strategy will be agreed with the ECO, and will include, but not be limited to, the re-use and recycling of any solid waste generated in construction activities.</li> <li>• Solid waste generated must be disposed off at the registered landfill site.</li> <li>• Existing infrastructure being demolished should be reused as far as possible.</li> <li>• Recyclable waste should be separated, reused and recycled at approved facilities. Proof thereof must be available.</li> <li>• Different waste bins, for different waste streams, should be provided to ensure correct waste separation.</li> <li>• All non-recyclable solid waste must be disposed off at a permitted landfill site, and proof will be available and presented to the ECO at the weekly site visits.</li> <li>• No building rubble shall be used for any infilling work.</li> <li>• Littering must be prohibited and dumping of any waste should not be allowed in undeveloped or open areas.</li> <li>• No waste material shall be burned buried in the sand or disposed of in any area that is not a licensed landfill site.</li> <li>• All general waste should be removed on a daily basis and disposed of in suitable waste receptacles.</li> <li>• Hazardous waste shall not to be mixed or combined with general waste earmarked for recycling or disposal at a licensed landfill site.</li> </ul>	General waste correctly disposed through landfill and records of disposal kept onsite	Medium	<i>Contractor and ECO</i>
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Sewage / Waste Water and Infrastructure	<ul style="list-style-type: none"> <li>• Discharge of waste from temporary chemical toilets into the environment should be strictly prohibited.</li> <li>• The contractor must ensure that demolition or construction work does not damage sewage infrastructure such as pipelines, manholes or pump stations. Should incidental damage occur, City of Ekurhuleni, Engineering Consultants and the ECO must be contacted immediately.</li> </ul>	Chemical toilets at an acceptable condition for human use.	<b>High</b>	<i>Contractor</i>
Hazardous Waste	<ul style="list-style-type: none"> <li>• Mixing/ decanting of all chemicals and hazardous substances should take place either on a tray or container with an impermeable surface.</li> <li>• Hazardous waste must be disposed at a Permitted Hazardous Waste Landfill Site. The contractor should therefore provide proof of disposal.</li> <li>• Hazardous waste bins should be clearly marked, stored in a contained area (or have a drip tray) and covered (either stored under a roof or the top of the container must be covered with a lid).</li> <li>• Relevant SABS Codes of Practice should be adhered to</li> </ul>	Hazardous waste correctly stored and disposed.	<b>Medium</b>	<i>Contractor</i>
<b>EROSION AND SEDIMENTATION MANAGEMENT</b>				

Erosion	<ul style="list-style-type: none"> <li>• Soil erosion through contractor activities must be prevented.</li> <li>• Suitable erosion control measures should be implemented in areas sensitive to erosion i.e. the newly rehabilitated. These measures could include: <ul style="list-style-type: none"> <li>✓ The suitable use of sand bags or soil saver;</li> <li>✓ The prompt rehabilitation of exposed embankment areas (with indigenous vegetation for example where appropriate)</li> <li>✓ Preventing the unnecessary removal of vegetation especially on steep areas;</li> </ul> </li> <li>• The time that stripped areas are left open to exposure should be minimised wherever possible. Care should be taken to ensure that lead times are not excessive.</li> <li>• Wind screening and storm water control should be undertaken to prevent soil loss from the site.</li> <li>• No large volumes of soil may be removed from the site except to carryout activities authorised</li> </ul>	Implementation of soil erosion control measures	<b>High</b>	<i>Contractor</i>
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**WATER MANAGEMENT**

Storm Water	<ul style="list-style-type: none"> <li>• To prevent storm water damage, the increase in storm water run-off resulting from construction activities must be estimated and if necessary, the drainage system must be assessed accordingly. A drainage plan must then be submitted to the Applicant for approval by the ECO.</li> <li>• Temporary cut off drains and berms may be required to capture storm water and promote infiltration.</li> <li>• Earth, stone and rubble must be properly disposed off so as not to obstruct natural water pathways over the site i.e. these materials must not be placed in storm water channels, drainage lines or the stream.</li> <li>• Storm water must be disposed off without causing soil saturation, erosion, sloughing and without affecting the integrity of the stream.</li> <li>• Where required, storm water pipelines should be cut back (retreat) and dropped to lower discharge levels.</li> <li>• Provision shall be made for storm water management measures that will ensure effective run-off control and prevent erosion at run-off points and ponding in depressions.</li> </ul>	None	Medium	Contractor and ECO
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Water Quality	<ul style="list-style-type: none"> <li>• Spills in bunded areas must be cleaned up, removed and disposed of safely from the bunded area as soon after detection as possible to minimise pollution risk and reduced bunding capacity.</li> <li>• No vehicle washing is allowed on site.</li> <li>• Provision should be made during set up for all polluted runoff to be treated to the Applicant's approval before being discharged into the storm water system. (This will be required for the duration of the project.)</li> <li>• Washing of clothes, equipment or machinery within any watercourse is prohibited</li> <li>• Mixing / decanting of all chemicals and hazardous substances must take place either on a tray or on an impermeable surface. Waste from these should then be disposed of to a suitable waste site.</li> <li>• Every effort should be made to ensure that any chemicals or hazardous substances do not contaminate the soil or ground water on site.</li> <li>• Site staff must not be permitted to use the stream for the purposes of bathing, washing of clothing or for any construction or related activities. Municipal water (or another source approved by the Applicant) should instead be used for all activities such as washing of equipment or disposal of any type of waste, dust suppression, concrete mixing, compacting etc.</li> <li>• Removal of vegetation should be avoided until such time as construction is required. Consultation with the ECO prior to removal will be necessary.</li> </ul>	No changes on the water quality in terms of color, consistency and odour during the construction period.	High	<i>Contractor</i>
AIR QUALITY				

	<ul style="list-style-type: none"> <li>• Removal of vegetation should be avoided until such time as construction is required. Consultation with the ECO prior to removal will be necessary.</li> <li>• All exposed surfaces must be re-vegetated and/or stabilised as soon as is practically possible.</li> <li>• No burning of waste, such as plastic bags, cement bags and litter, should be permitted at the contractor or restoration sites.</li> <li>• A complaints register should be provided to report any excessive dust incidents.</li> <li>• The Contractor must make alternative arrangements (other than fires) for cooking and / or heating requirements. LPG gas cookers may be used provided that all safety regulations are followed.</li> </ul>	None	Medium	<i>Contractor</i>
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**NOISE**

	<ul style="list-style-type: none"> <li>• Construction activities must be undertaken according to working hours stipulated by the Applicant i.e. during daylight hours only.</li> <li>• Construction vehicles and equipment generating excessive noise should be fitted with appropriate noise abatement measures.</li> <li>• Construction workers must be provided with the appropriate PPE i.e. ear plugs.</li> <li>• A complaints register must be provided to record any complaints regarding excessive noise.</li> <li>• All complaints received must be investigated and a response given to the complainant within 14 days</li> </ul>	None	Low	<i>Contractor and ECO</i>
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**PROTECTION OF FAUNA AND FLORA**



Fauna and Flora	<ul style="list-style-type: none"> <li>No vegetation may be cleared without prior permission from the Applicant / ECO</li> <li>Trees that are not to be cleared should be marked beforehand with danger tape. The ECO must be given a chance to mark vegetation that is to be conserved before the Contractor begins clearing the site.</li> <li>Care must be taken to avoid the introduction of alien plant species to the site and surrounding areas. Particular attention must be paid to imported material.</li> <li>Disturbance to birds, animals and reptiles and their habitats should be minimised wherever possible.</li> <li>No natural vegetation is to be collected for use as firewood.</li> <li>Only riparian, indigenous plant species are to be used in the landscaping</li> <li>No animals are to be disturbed unnecessarily and no animals are allowed to be shot, trapped or caught for any reason.</li> <li>No large trees are to be removed for any construction activities, unless they are classified as an invader species or are part of the approved removal and transplanting program. Consultation with the ECO prior to removal will be necessary.</li> <li>Invader species and weeds must be removed and disposed of in accordance with existing legislation on a</li> </ul>	None	High	<i>Contractor /Applicant and ECO</i>
Sensitive Habitats	<ul style="list-style-type: none"> <li>Areas which are identified by the Applicant or the ECO as being ecologically sensitive and which are adjacent to any construction work are to be suitably demarcated to prevent damage by plant and labour.</li> </ul>	Demarcation of sensitive areas	Medium	<i>Contractor</i>

**AREAS OF SPECIFIC IMPORTANCE**

Archaeological Sites	<ul style="list-style-type: none"> <li>• If an artefacts on site is uncovered, work in the immediate vicinity must be stopped immediately.</li> <li>• The contractor must take reasonable precautions to prevent any person from removing or damaging any such article and must immediately, upon discovery thereof, inform the Applicant or ECO of such discovery.</li> <li>• Approval must be obtained from the relevant authorities should there be the need to demolish any sites of archaeological and cultural significance during the detailed design phase of the development. Demolition/construction work may only commence once approval has being obtained.</li> <li>• Work may only resume once clearance is given in writing by an archaeologist.</li> <li>• If a grave or midden is uncovered on site, or discovered before the commencement of work, then all work in the immediate vicinity of the graves/middens must be stopped and the Applicant or ECO informed of the discovery.</li> <li>• The relevant authorities should be contacted and in the case of graves, arrangements made for an undertaker to carry out exhumation and reburial.</li> <li>• The project proponent will, in the case of graves, together with the National Monuments Council, be responsible for attempts to contact family of the deceased and for the site where the exhumed remains can be re-interred.</li> </ul>	None	Low	<i>Contractor</i>
<b>PUBLIC AND WORKFORCE SAFETY</b>				

General	<ul style="list-style-type: none"> <li>• Dedicated pathways (temporary) for pedestrians should be developed to ensure safe passage around construction activities.</li> <li>• Construction activities should be undertaken according to working hours stipulated by the Applicant i.e. during daylight hours only.</li> <li>• A safety officer must be appointed who will continuously monitor safety conditions during demolition and construction activities.</li> <li>• Flag men should be appointed and provide ample warning of road hazards</li> <li>• The dangers associated with construction site entry and exit points and public access points should be given special consideration.</li> <li>• All members of the construction workforce working on the site or near the roads shall be provided with the appropriate high visibility clothing to ensure that can be distinguished from the general public and be seen by motorists.</li> <li>• All construction workers handling chemical or hazardous substances should be trained in the use of such substances and the environmental, health and</li> </ul>	Road Traffic Signs and flagmen located on identified access roads.	Low	<i>Contractor</i>
Fencing	<ul style="list-style-type: none"> <li>• The site should be secured in order to reduce the opportunity for criminal activity in the locality of the construction site.</li> <li>• Confined sites within the residential area should be fenced and manned to control the access of persons to the site. Potentially hazardous areas such as trenches are to be demarcated and clearly marked.</li> </ul>	Secured fence around the construction camp.	Low	<i>Contractor</i>
<b>SOCIAL IMPACTS</b>				

Disruption of Infrastructure and Services	<ul style="list-style-type: none"> <li>• Contractor's activities and movement of staff should be restricted to designated construction areas.</li> <li>• Should construction staff be approached by members of the public or other stakeholders, they should assist them in locating the Applicant or Contractor, or provide a number on which they may contact the Applicant or Contractor.</li> <li>• The conduct of the construction staff when dealing with the public or other stakeholders shall be in a manner that is polite and courteous at all times. Failure to adhere to this requirement may result in the removal of staff from the site by the Applicant.</li> <li>•</li> </ul>	None	Low	<i>Contractor</i>
Visual	<ul style="list-style-type: none"> <li>• Temporary structures on site should be located such that they have as little visual impact on local residents as possible.</li> <li>• Special attention should be given to the screening of highly reflective materials on site.</li> <li>• Lighting on site is to be set out to provide maximum security and to enable easier policing of the site, without creating a visual nuisance to local residents or businesses.</li> <li>• Lighting on the construction site should be pointed downwards and away from oncoming traffic and nearby houses</li> </ul>	None	Low	<i>Contractor</i>
<b>MONITORING, REPORTING AND RECORD KEEPING</b>				
Environmental Monitoring and Record Keeping	<ul style="list-style-type: none"> <li>• Monitoring must be undertaken in order to ensure compliance with all aspects or requirements of the EMP.</li> <li>• The Contractor must provide proof of disposal of building rubble, domestic waste, industrial waste and hazardous waste to licensed waste disposal or recycling facilities.</li> <li>• The ECO / Environmental Assessment Practitioner should review and update the EMP, as required and communicate the changes to the GDARD, and Contractor.</li> </ul>	Monitoring Reports	None	<i>ECO</i>

Complaints register and environmental incident book	<ul style="list-style-type: none"> <li>Complaints received from the community and other I&amp;AP's shall be registered and recorded by the Site Environmental Officer and brought to the attention of the ECO and contractor. All relevant parties shall respond accordingly. The following information shall be recorded <ul style="list-style-type: none"> <li>in the case of any complaint/incident: <ul style="list-style-type: none"> <li>✓ Time, date and nature of complaint;</li> <li>✓ Response and investigation undertaken; and</li> <li>✓ Corrective and preventative actions taken and by whom.</li> </ul> </li> </ul> </li> <li>All complaints received shall be investigated and a response given to the complainant within 14 days.</li> </ul>	Updated Complaints Register	None	<i>ECO</i>
<b>POLLUTION CONTROL AND EMERGENCY PROCEDURES</b>				
Pollution control & emergency procedures	<ul style="list-style-type: none"> <li>The Contractor should ensure that relevant pollution control and emergency procedures are developed and the workforce trained on these procedures to ensure that correct actions are followed during pollution or emergency situations.</li> <li>Materials such as fuels, paints and chemicals used in the construction phase must be carefully stored and handled to minimise the risk of spillage into the environment.</li> <li>Any soil contaminated during construction must be removed and disposed of at a licensed disposal site.</li> </ul>	None	<b>Medium</b>	<i>ECO and Contractor</i>
<b>CONSERVATION OF WETLANDS</b>				
Planning	<ul style="list-style-type: none"> <li>Erosion berms should be installed to prevent gully formation. Berms should be installed every 50m where the track has a slope of less than 2%, every 25m where the track slopes between 2% and 10%, every 20m where the track slopes between 10% and 15% and every 10m where the track slope is greater than 15%.</li> </ul>	None	<b>Medium</b>	<i>Contractor</i>



Table 6: Post-construction Phase of Mashimong Parks EMP

ISSUES	MITIGATION MEASURES	PERFORMANCE INDICATOR	RATING	RESPONSIBILITY
<b>POST CONSTRUCTION</b>				
Vegetation	<ul style="list-style-type: none"> <li>All established vegetation should be monitored on a monthly basis by an ecologist until properly established and appropriate actions must be implemented to address poor establishment as per ecologist recommendations.</li> <li>Final rehabilitation of contractor sites should be completed within a period specified by the Applicant.</li> </ul>	Plantation of vegetation to rehabilitate the area.	<i>Low</i>	<i>Applicant</i>
Construction Infrastructure	<ul style="list-style-type: none"> <li>All remaining construction infrastructure, building rubble and waste will be removed from the site as directed by the ECO.</li> </ul>	Site clear of construction infrastructure.	<i>Low</i>	<i>Contractor and ECO</i>
Site Camp	<ul style="list-style-type: none"> <li>The contractor's camp site must be rehabilitated to its pre-establishment condition or agreed alternative.</li> </ul>	None	<i>Low</i>	<i>Contractor</i>
Waste Management	<ul style="list-style-type: none"> <li>Waste material of any description, including receptacles, scrap, rubble and tyres, shall be removed entirely from the contractor's camp and disposed of at a recognized landfill facility</li> </ul>	Site clear of construction waste material.	<i>Low</i>	<i>Contractor</i>
Landscaping For Rehabilitation	<ul style="list-style-type: none"> <li>Only riparian, indigenous plant species are to be used in the landscaping</li> </ul>	None	<i>Low</i>	<i>Applicant and Contractor</i>

ISSUES	MITIGATION MEASURES	PERFORMANCE INDICATOR	RATING	RESPONSIBILITY
<b>COMPONENTS OF THE DEVELOPMENT</b>				
Road	<ul style="list-style-type: none"> <li>Access to the construction area to be established</li> </ul>	Easy flow of traffic. No adverse visual impact	Low	COE Roads and Stormwater Division
Stormwater system	<ul style="list-style-type: none"> <li>Minimise potential adverse impact of stormwater damage during rainy season</li> </ul>	Stormwater to be managed in accordance with the engineer's designs	Low	COE Roads and Stormwater Division
<b>SOCIO-ECONOMIC</b>				
Air Pollution	<ul style="list-style-type: none"> <li>Provide bowser should excessive dust occur</li> </ul>	No situations of excessive dust	Medium	COE Metroparks
<b>STORMWATER MANAGEMENT</b>				
Maintenance Stormwater management	<ul style="list-style-type: none"> <li>Stormwater shall be managed in accordance with plans that are approved by the local authority</li> <li>Regular maintenance of system</li> </ul>	To satisfaction of local authority and engineer.  No flooding	Low	COE Roads and Stormwater
Control of open trenches	<ul style="list-style-type: none"> <li>Open trenches during future construction shall be left open for a minimum period but demarcated and access prevented</li> </ul>	To satisfaction of local authority	Low	COE Metroparks
Erosion	<ul style="list-style-type: none"> <li>Siltation of stormwater</li> </ul>	Regular maintenance	Low	COE Metroparks
<b>CONSERVATION OF WETLANDS</b>				

Planning	<ul style="list-style-type: none"> <li>• Areas should be reseeded with indigenous grasses as specified by a suitably qualified specialist (ecologist).</li> <li>• Identify areas which are at risk of erosion.</li> <li>• As much vegetation growth as possible should be promoted within the proposed development area in order to protect the soil and to reduce the percentage of the surface area which is paved. In this regard special mention is made of the need to use indigenous vegetation species as the first choice during landscaping.</li> <li>• Implement waste management criteria considered in the Environmental Management Plan in order to prevent construction-related waste from entering the wetland environment.</li> </ul>	None	Low	Contractor
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Table 7: Operational Phase of Mashimong Parks Development EMP

## **7 ENVIRONMENTAL CODE OF CONDUCT**

One of the objectives of the EMP is to ensure that all the workforce, contractors, subcontractors and construction staff have an understanding of environmental issues and potential impacts on site activities. This environmental code of conduct provides the basic rules that should be strictly adhered to. It is the responsibility of the Site Environmental Officer and ECO to ensure that each contractor, sub-contractor and workforce understand and adhere to the Code of Conduct.

### **ALL PERSONS ARE OBLIGED TO KEEP TO THE RULES OF THIS CODE OF CONDUCT**

#### **7.1 *Environmental Rules***

- Do not waste electricity, water or consumables;
- Only use authorised accesses;
- Do not litter;
- Dispose solid waste to the correct waste containers provided;
- Prevent pollution;
- Use the toilet facilities provided;
- Do not dispose contaminated waste water to the storm water or the environment;
- Immediately report any spillage from containers, plant or vehicles;
- Do not burn or bury any waste on site;
- Do not trespass into private properties;
- Strictly leave all animals alone. Never tease, catch or set devices to trap or kill any animal;
- Never damage or remove any trees, shrubs or branches unless it forms part of working instructions;
- Do not deface, draw or cut lettering or any other markings on trees, rocks or buildings in the area;
- Know the firefighting procedure and locations of firefighting equipment; and
- Know the environmental incident procedures.

## **Appendix A: Non – Compliance Procedures**

The CONTRACTOR shall comply with the environmental specifications and requirements on an on-going basis and any failure on his part to do so will entitle the engineer &/or the ECO to impose a penalty.

Non-compliance with the condition of this EMP, which forms part of the contract agreement, will constitute a breach of contract. Penalties will be issued in instances of non-compliance by THE CONTRACTOR, any employee, sub-CONTRACTOR or supplier.

The engineer will issue penalties directly to the CONTRACTOR for non-compliance with the EMP. (NOTE THAT THESE PENALTIES DO NOT PRECLUDE PROSECUTION UNDER ANY OTHER LAW).

Any non-compliance with the agreed procedures of the EMP is a transgression of the various statutes and laws that define the manner by which the environment is managed therefore any avoidable non-compliance, dependent on severity, shall be considered sufficient grounds for contact to be made with relevant provincial or national authorities.

Complaints received regarding activities on the construction site pertaining to the environment shall be recorded in a dedicated register and the response noted with the date and action taken. This record shall be submitted with the monthly reports and an oral report given at the monthly site meetings.

In the event if non-compliance the following recommended process shall be followed:

- ❖ The engineer shall issue a notice of non-compliance to the CONTRACTOR, stating the nature and magnitude of the contravention. A copy shall be provided to the ECO.
- ❖ The CONTRACTOR shall act to correct the non-conformance within 24hours of receipt of the notice, or within a period that may be specified within the notice.
- ❖ The CONTRACTOR shall provide the engineer with a written statement describing the actions to be taken to discontinue the non-conformance, the actions taken to mitigate its effects and the expected results of the actions
- ❖ A copy shall be provided to the ECO who will assess it and accept or reject and advise on an acceptable way forward.
- ❖ In the case of the CONTRACTOR failing to remedy the situation within the predetermined time frame, the engineer in consultation with the ECO shall impose a monetary penalty based on the conditions of contract.
- ❖ In the case of non-compliance giving rise to physical environmental damage or destruction, the Proponent in consultation with the engineer and the ECO shall be entitled to undertake such remedial works as may be required to make good such damage and to recover from the CONTRACTOR the full costs incurred in doing so.
- ❖ The engineer or the ECO in consultation with the engineer shall at all times have the right to stop work and/or certain activities on site in the case if non-compliance or failure to implement remediation measures.
- ❖ The issuing of a penalty will usually be preceded by a verbal warning by the engineer, during which a time frame for rectifying the situation, as well as the penalty to be implemented



should this not be done within the time frame, will be agreed on. The value of the penalty will depend on the seriousness of the contravention.

- ❖ The addition to penalties, the Engineer may instruct the removal from Site any person who is in contravention of the EMP, and if necessary, the Engineer can suspend the relevant part or all of the works, as required.
- ❖ Note that penalties can be issued over and above costs that are incurred for the repair of rehabilitation of any environmental damage caused by the CONTRACTOR and all the parties over which they have responsibility. In this regard cost incurred by the CONTRACTOR in repairing or rehabilitating any environmental damage caused by non-compliance with the EMP cannot be claimed in the Contract Bill, nor can any extension of time be claimed for such works.
- ❖ Penalty amounts shall be deducted from Certificate payments made to the CONTRACTOR.
- ❖ Penalty amounts must be used by the Proponent to rehabilitate the construction area.

The engineer's decision (in consultation with the ECO) with regard to what is considered a violation, its seriousness and the action to be taken against the CONTRACTOR shall be final.

Failures to redress the cause shall be reported to the relevant authority. The responsible provincial or national authorities shall ensure compliance and impose penalties relevant to the transgression as allowed for within its statutory power.

## Appendix B: Non-Compliance Penalties

TYPICAL INCIDENTS INCURRING PENALITIES/FINES	VALUE (R)
Failure to strip topsoil with intact vegetation	2000.00
Failure to stockpile topsoil correctly	800.00
Failure to stockpile materials in designated areas	1000.00
Pollution of any water bodies – incl. increase in suspended solids	5000.00
Failure to provide adequate sanitation ( Chemical toilets/ablution); waste disposal facilities or services	2000.00
Insufficient education of staff regarding environmental matters and site house-keeping practices	1000.00
Inappropriate use of bins and poor waste management on site	500.00 per incident/per day
Failure to provide sufficient toilets	2000.00
Individual not making use of ablution facilities	200.00
Use of soil in an unspecified manner	1000.00
Inappropriate mixing of cement / concrete and poor management of cement slurry	2000.00
Failure to re-instate disturbed/damaged areas within specified time-frames	1000.00 ( per day of non-reinstatement)
Failure to erect temporary fencing as required – including protection fences around vegetation	1000.00
Failure to demarcate trenching with protective fencing	5000.00
Unauthorized removal/pruning of indigenous trees or other plants	5000.00
Unauthorized removal/damage of any plant protected under law	5000.00
Unauthorized removal of any medicinal plant	5000.00
Animal/Bird Poaching	5000.00

TYPICAL INCIDENTS INCURRING PENALITES/FINES	VALUE (R)
Fire – costs of runaway fires will be borne by THE CONTRACTOR, should such THE CONTRACTOR and/or staff be proven responsible for such fires	5000.00
Lighting of illegal fires on site – all costs of run-away fires will be borne by the primary CONTRACTOR.	500.00
Failure to provide emergency equipment incl. first aid kit	1000.00
Failure to maintain basic safety measures on site	5000.00
Spillage of fuels or other hazardous materials on site	1000.00
Persistent and un-repaired oil leaks from machinery. The use of inappropriate re-fuelling methods.	1000.00
Failure to provide drip trays and/or empty them frequently	500.00
Improper use of plant or equipment including driving above set speed limit	500.00
Dust or excessive noise on or emanating from the site	1000.00
Any person, vehicle, item of plant or anything related to THE CONTRACTOR/s operation causing a public nuisance	500.00
Any persons, vehicles, item of plant, or thing related to THE CONTRACTOR operations within “no-go “ area	2000.00
Failure to maintain register of incidents on site	1000.00
Failure to remove all temporary features and leftovers from the construction site and works areas upon completion of the works	25000.00

**Appendix C: Environmental Complaints Register**

<b>Environmental Complaints Register</b>					
<b>Name of Complainant</b>	<b>Contact Details</b>	<b>Nature of Compliant</b>	<b>Responsible Person</b>	<b>Date Action Taken</b>	<b>Details of Action Taken</b>

**Appendix D: Environmental Incidents Register**

<b>Environmental Incidents Register</b>					
<b>Date</b>	<b>Incident</b>	<b>Action Required</b>	<b>Responsible Person</b>	<b>Action Implemented</b>	<b>Date Action Implemented</b>









## **Appendix I: Other information**