



MYEZO ENVIRONMENTAL MANAGEMENT SERVICES

Environmental Stewardship

LEBONE ENGINEERING -KLIP MIDDLE SOWETO -ENVIRONMENTAL STUDIES CITY PARKS AND ZOO

**DRAFT BASIC ASSESSMENT REPORT FOR THE ENVIRONMENTAL STUDIES THAT WAS
UNDERTAKEN IN KLIP MIDDLE SOWETO, IN JOHANNESBURG, WITHIN THE CITY OF
JOHANNESBURG MUNICIPALITY**

**Document Name: LSES/LRES-ES-Reports-Draft Basic Assessment Report
Rev 0.1**

VOLUME 1 OF VOLUME 2

**BASIC ASSESSMENT REPORT -PROJECT DESCRIPTION, ENVIRONMENTAL SETTINGS, IMPACT
ASSESSMENT, PUBLIC INVOLVEMENT ATTACHMENTS AND SUPPORTING DOCUMENTS
(APPENDICES A-G,1)**

Date: 18 AUGUST 2016

GDARD Ref No: Gaut: 002/16-17/E0097

Lebone Ref No: JCP&Z-09/2015

Myezo Ref No: LSES, LRES 2015/10/SA

Myezo Ref No: LSES, LRES 2015/10/SA



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)

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.

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

(For official use only)

NEAS Reference Number:						
File Reference Number:						
Application Number:						
Date Received:						

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.

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.

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?

If no, state reasons for not attaching the list.

Have State Departments including the competent authority commented?

If no, why?

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SECTION A: ACTIVITY INFORMATION

1. PROPOSAL OR DEVELOPMENT DESCRIPTION

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

The proposed Environmental Rehabilitation of the Klip Middle Soweto Water Management Unit (WMU) for the City of Johannesburg Municipality (CoJ).

Select the appropriate box

The application is for an upgrade of an existing development

The application is for a new development

Other, specify

Does the activity also require any authorisation other than NEMA EIA authorisation?

 NO

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

Activity Description:

The vision of the City of Johannesburg (CoJ) is to be a green, clean, conserved and active world-class African city with a mission to develop, maintain and conserve public open spaces, cemeteries and animal life for present and future generations. The city has invested an operational budget of R 692.8 million, a capital development budget of R102.2 million and a staff complement of 1 563 permanent employees towards the implementation of its objectives. The city provides following products and services:

- Urban parks, recreation and leisure facilities;
- Johannesburg Zoo;
- Zoo Conservation and Research Farm;
- Cemeteries and crematoria;
- Botanical Services;
- Nature reserves, including bird sanctuaries, nature trails, dams and lakes;
- Environmental education;
- Biodiversity and Conservation Management;
- Eco-tourism products and services;
- Trees and arboriculture services

The City of Johannesburg is committed to achieving the environmental goals set out in its City's Growth and Development Strategy (GDS) and has embarked on a programme aimed at the rehabilitation of the City's Water Management Units (WMU's).

The Johannesburg City Parks and Zoo (JCPZ) is mandated by the City of Johannesburg (CoJ) to manage the City's cemeteries, parks and designated public open spaces as well as to ensure that its environmental conservation function is carried out, which includes the maintenance of all street and park trees within the City's borders, the Zoo with the preservation and management of biodiversity through direct conservation action, education, research and recreation. This involves the management of 22 278 hectares of open space and green areas made up to more than 2 343 parks (JCPZ website).

The proposed project intends to assist the CoJ with its GDS goals of environmental sustainability through the rehabilitation of areas within the Klip Middle Soweto Water Management Unit study area and to develop them into components as identified in the CoJ Master Plan. This includes rehabilitation of wetland areas and the development of parks at strategic parts of the study areas.

The study extends through the following areas:

Study Area Description	
Farm/ Erf Name and numbers (including portion/holding) of all proposed sites:	Jabavu Central Ext 1: 36/298 - IQ
	Jabulani ext. 1 : 6/233 - IQ
	Mofolo Central : 2114
	Dube : 388 - IQ
	Soweto : 387 - IQ
	Orlando : Undefined
	Fluerhof Ext 4 : 1624

	Orlando West Ext 2 : 81/388 - IQ Orlando West Ext 5 : 388 - IQ
Property size(s) (ha) of all proposed sites	Jabavu Central Ext 1: 1.7505234695120002 Jabulani ext. 1 : 612.394228353369954 Mofolo Central : 0.25000559238199999 Dube : 207.923136063457008 Soweto : 182.2118646954479573 Orlando : 18.7121627312809977 Fluerhof Ext 4 : 8.3542769843679991 Orlando West Ext 2 : 17.6356261521150017 Orlando West Ext 5 : 430.375895589809943
Property size(s) (m ²) of all proposed sites:	Jabavu Central Ext 1: 17505.23469512 Jabulani ext. 1 : 6123942.2835337 Mofolo Central : 2500.05592382 Dube : 2079231.36063457 Soweto : 18212118.64695448 Orlando : 187121.62731281 Fluerhof Ext 4 : 83542.76984368 Orlando West Ext 2 : 176356.26152115 Orlando West Ext 5 : 4303758.9558981
Development footprint size(s) in ha/m ²	1080.6 ha
SG Digit code(s) of all proposed sites:	Jabavu Central Ext 1: T0IQ0553001000003460000000 Jabulani ext. 1 : T0IQ0000233000002330000600 Mofolo Central : T0IQ0560000000021140000000 Dube : T0IQ0000388000003880000000 Soweto : T0IQ0000387000003870000000 Orlando : T0IQ00003180000031800006RE Fluerhof Ext 4 : T0IQ0118004000016240000000 Orlando West Ext 2 : T0IQ00003880000038800008100 Orlando West Ext 5 : T0IQ00003880000038800000RE
Current Zoning of site(s)	Jabavu Central Ext 1: Public Open Space Jabulani ext. 1 : Undefined Mofolo Central : Municipal Dube : Community Facility Soweto : Undefined Orlando : Dermacated Mining Land Fluerhof Ext 4 : Business Orlando West Ext 2 : Residential Orlando West Ext 5 : Undetermined

Areas in the study area that have been identified for rehabilitation are also illustrated in Appendix A:

- Dorothy Nyembe Park
- Dhlamini street drainage outlets
- Mfolo wetland
- Florida catchment area

The following areas have been identified for the construction of public parks as illustrated in Appendix A:

- Jabulani hostels
- N17 intersection
- Molo south walk ways
- Orlando west walk ways

The rehabilitation interventions to be implemented include the following:

Erosion control:

- Re-shape the river using Erosion Control Fences (Gabions, Box Gabions, Gabion Mattresses) in the areas are illustrated in Annexure A
- Repair storm water outlets
- Create Dissipation/attenuation structures at storm water outlets

- Protect/rehabilitate the riverine zone as a buffer area
- Gravel bags, used to filter large silt particles ore reduce flow velocity
- Soil bioengineering techniques, to use of a variety of plant species without any artificial materials to control across the study areas
- Removal of sedimentation/siltation at the river banks in such a manner that it blends with the surrounding natural area.
- Concrete weir structures to be used to address head cut and/or channel erosion by trapping sediment and raising the local water table to encourage overland flow (i.e. rewetting a wetland)
- Earth berms/plugs - Earth berms are structures used to divert or retain water and are used to increase water levels in a wetland above historic levels to create open water
- Construction of flood protection berms at areas located close to the water resource.

Prevention of Ecological Degradation:

- Manual and Chemical eradication of Invasive alien species to be done manually or mechanically. Methods include the use of herbicides, grazers or pathogens.
- Institute eradication and monitoring plan
- Rehabilitate cleared areas
- Create additional wetland habitat through off-stream wetlands
- Create attenuation areas, flow dissipation areas and natural waste traps

Addressing Illegal Waste Dumping:

- Remove waste and clear illegal waste dumps
- Create flow dissipation areas and natural waste traps
- Removing the siltation in blocked culverts
- Regular maintenance of the culverts crossing the river system
- Improvement of waste collection and disposal at the communities to alleviate illegal disposal of waste

In order to ensure proper maintenance and function of the rehabilitated areas, the development of parks within the rehabilitated areas is an additional measure to ensure the protection of further degradation to the wetland health status in the area.

The proposed development areas of such parks are identified in Zones 1, 2, 3 and 4 as illustrated in the Zoning and Concept Map in Annexure A.

The development process, pertaining to parks will include the construction of various types of parks that serve specific functions within identified zones as follows:

- Create **pocket parks** in available, natural open space areas within suburban green corridors to serve local users. Due to the nature of the built environment, accessibility will most likely be semi-public. Provide low-key amenities for daily use, including small kick-about, picnic and play spaces.

- Create **community parks**. To provide amenities and facilities for daily and regular use, including sports courts, kick-about areas, picnic areas, playgrounds, events spaces and environmental education centres.

- Formalise regional parks

Develop regional parks to provide large formalised facilities that facilitate activities such as events space, sports facilities, playgrounds, features, vendor facilities, as well as picnic areas.

- Create **rehabilitated areas** in derelict strips between the mining edge and the river to serve community users. Accessibility must be public. Provide amenities and facilities for daily and regular urban use, including seating, vendor space and gathering space as well as signage.

Engagement of Specialists

In order to identify potential impacts of the proposed activity of wetland rehabilitation and development of parks within the study area, several Specialists were engaged to conduct preliminary assessments of the area. The details of the Specialists engaged are provided in Table 1-1 below.

Table 1-1. Specialists engaged to conduct Impact Assessment Studies within the study area.

Name	Company	Contact Details	Field of Speciality	Report attachment
Mr Ishmael Phalane	Letsolo Water and Environmental Services cc	Tel: 012 - 373 5702 Cell: 082 821 6621 Email: ishmael@lwes.co.za Fax: 086 6134 794	Civil Engineer Technologist - Hydrological Impact Assessment	Appendix G.1
Mr Andrew Mavurayi	Waters Without Frontiers Water & Environmental Consultancy	Tel: 012 - 323 0072 Cell: 082 600 2142 Email: andrew.mavurayi@gmail.com Fax: 086 7234 023	Hydrogeologist - Geohydrological Impact Assessment	Appendix G.2

Nonkanyiso Zungu	Sazi Environmental Services	Tel: 011 - 312 2806 Cell: 084 8000 187 Email: nzungu@sazienvironmental.co.za Fax: 011 - 312 7208	Ecology/Wetland Specialist - Biodiversity Impact Assessment	Appendix G.3
Nonkanyiso Zungu	Sazi Environmental Services	Tel: 011 - 312 2806 Cell: 084 8000 187 Email: nzungu@sazienvironmental.co.za Fax: 011 - 312 7208	Ecology/Wetland Specialist - Wetland Impact Assessment	Appendix G.4
Mr Wouter Fourie	PGS Heritage	Tel: 012-332 5305 Cell: 082 851 3575 Email: wouter@pgsheritage.co.za Fax: 086 6758 077	Heritage Consultant - Heritage Impact Assessment	Appendix G.5

If yes, have you applied for the authorisation(s)?

If yes, have you received approval(s)? (attach in appropriate appendix)

YES	NO
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.

The applicable legislation to this application is outlined below in Table 2.1-1.

Table 2.1-1. Applicable Legislation, Policies and Guidelines

Title of legislation, policy or guideline:	Administering authority:	Approvals and licences which might be required by CoJ
Constitution of the Republic of South Africa (Act No.108 of 1996, Section 24)	National & Provincial Department of Justice and Constitutional Development	No licence, but general respect for the environment and people's rights to a healthy and clean environment during construction and operation of the
National Environmental Management Act, 1998 (Act No. 107 of 1998 as amended in 2010). NEMA	National & Provincial Department of Environmental Affairs	Provides for cooperative environmental governance by establishing principles for decision making on matters affecting the environment. The legislation in the act provides for environmental management in the country.
Department of Environmental Affairs National Environmental Management Act, 1998 (Act No. 107 of 1998) 2014 Listing Notices 3, 04 December 2014	National Department of Environmental Affairs	Provides for environmental authorisation for listed activities are the details of the requirements are given in Table 2.1-2 below.
Environmental Impact Assessment Regulations have been promulgated in terms of Section 21 of the Environment Conservation Act, No 73 of 1989		
National Water Act, 1998 (Act 36 of 1998) NWA	National & Provincial Department of Water and Sanitation	Provides for all aspects relating to pollution of surface water. To take all reasonable measures to prevent any pollution of a water resource from occurring, continuing or recurring. Provides provisions for the protection, use, development, management, conservation and control of South African's water resources.
National Environmental Management: Waste Act.2008 (Act 59 of 2008) NEMWA	National Department of Environmental Affairs	To reform the law regulating waste management in order to protect health and environment by providing reasonable measures for the prevention of pollution, ecological degradation and for securing ecologically sustainable development.
National Environmental Management: Waste Act, 2008 (Act No.59 of 2008) List of Waste Management Activities: Govt Notice No. 921 of 29 Nov 2013 as amended by Government Notice No. R332 of 2 May 2014 and as also amended by Govt. Notice No. R633 of 24 July 2015.	National & Provincial Department of Environmental Affairs	Protection of the surrounding environment through efficient waste management by ensuring proper waste collection, transportation, storage, disposal and treatment by the Appointed contractor.
Mineral and Petroleum Resources Development Amendment Act, (Act No. 49 of 2008) (MPRDA).	National	Approval is required for the excavation, establishment of borrow pit etc from Department of Minerals and Energy for

	Department of Mineral Resources	the construction of roads and other infrastructure.
Mineral and Petroleum Resources Development Act, (Act No. 28 of 2002).	National Department of Mineral Resources	Addressing the impact of mine dumps.
National Environmental Management Laws Amendment Act, (Act No.107 of 1998).	National	Environmental protection and mitigation against negative impacts the development or rehabilitation might present
Atmospheric Pollution Prevention Act (Act 45 of 1965)	Department of Environmental Affairs Chief Air Pollution Control Officer (CAPCO) in the Directorate of Air Pollution within DEAT and local authority inspectors.	Controls all forms of air pollution. - Smoke control zones - Dust control - Air pollution from waste
National Environmental Management: Air Quality Act (Act No. 39 of 2004); National Dust Control Regulations, 2013.	National Department of Environmental Affairs Chief Air Pollution Control Officer (CAPCO) in the Directorate of Air Pollution within DEAT and local authority inspectors.	Declaration of dust control areas. Steps to prevent atmospheric pollution by dust.
National Environmental Management: Air Quality Amendment Act (Act No. 20 of 2014).	National Department of Environmental Affairs Chief Air Pollution Control Officer (CAPCO) in the Directorate of Air Pollution within DEAT and local authority inspectors.	Declaration of dust control areas. Steps to prevent atmospheric pollution
Health Act (Act 63 of 1977)	National Department of Health	Control of health aspects of waste disposal and water treatment Regulates, rubbish, sewage
National Environmental Management: Biodiversity Act (Act No. 10 of 2004). NEMBA	National Department of Environmental Affairs	The provisions of the Act and Regulations have been used in the compilation of mitigation measures in Section h (viii) and (i) (ix). Biodiversity management through proper rehabilitation measures. This includes the protection of species and ecosystems; the sustainable use of indigenous biological resources; the fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources; and the establishment of a South African National Biodiversity institute.
National Environmental Management: Biodiversity Act (Alien and Invasive Species Regulations, 2014).	National Department of Environmental Affairs	The mitigation measures section considers that alien invasive species management.

National Environmental Management: Biodiversity Act (Publication of national list of invasive alien species).	National Department of Environmental Affairs	The mitigation measures section considers that alien invasive species management.
National Environmental Management: Biodiversity Act 10 of 2004. (Regulation 8 of the Alien and Invasive Species Regulations, 2014).	National Department of Environmental Affairs	Invasive species are now deemed to be a legal liability of the property owner and it is up to the landowner to ensure that all invasive species are safely removed from their land in accordance with the regulations and permitting requirements.
National Heritage Resources Act (Act 25 of 1999) (NHRA)	National South African Heritage Resources Agency	Controls for the protection of natural and cultural heritage resources. No archaeological remains were seen or noticed during the site visits. Should there be any identification of the archaeological artifacts during construction or operation/ South African Heritage Resources Agency will be notified
Conservation of Agricultural Resources Act (Act 43 of 1983) In March 2001, Regulations 15 and 16, were promulgated in terms of the Conservation of Agricultural Resources Act (No. 43 of 1983).	National Department of Environmental Affairs	Conservation of Agricultural Resources Act 43 of 1983: Section 5 of the Act prohibits spreading of weeds. Controls the utilisation and protection of wetlands, soil conservation, control and prevention of veld fires, control of weeds and invasive plants. Regulations stipulate that weeds and invader plants should be eradicated or controlled in areas where they are not used for recreational or economic purposes.
Environment Conservation Act (Act 73 of 1989)	National	Provides control for the effective protection and utilisation of the environment, littering, waste disposal, noise and various other activities, which may have a detrimental effect on the environment Provides for waste management
Regulations Environmental Impact Assessment Regulations have been promulgated in terms of Section 21 of the Environment Conservation Act, No 73 of 1989	National Department of Environmental Affairs	The regulation provides for the following objectives: - to regulate the procedure and criterias contemplated in Chapter 5 of the Act relating to the preparation, evaluation, submission, processing and consideration of, and decision on, applications for environmental authorisations for the commencement of activities, subjected to environmental impact assessment, in order to avoid or mitigate detrimental impacts on the environment, and to optimise positive environmental impacts, and for matters pertaining thereto.

National Environmental Management: Biodiversity Act 10 of 2004. (Regulation 8 of the Alien and Invasive Species Regulations, 2014).	National Department of Environmental Affairs	Invasive species are now deemed to be a legal liability of the property owner and it is up to the landowner to ensure that all invasive species are safely removed from their land in accordance with the regulations and permitting requirements.
Guidelines: 27 September 2005: Guidelines for clearing invasive alien plants Guidelines for clearing of invasive in terms of section 75 and 75 of national Environmental Management: Biodiversity act, 2004 (act no. 10 of 2004) (NEMBA) and as required by section 76 of this act	Provincial	Provides guidance on how to clear invasive alien plants NEMBA Sections 75 and 76 are very specific in terms of who must develop these Invasive Species Monitoring, Control and Eradication Plans, what the plans must include and how they should be implemented.
CoJ Metro Municipal By-laws: (32 of 2000)	Provincial	Provides for the protection of the environment.
CoJ - Stormwater Management By-Laws	Provincial	To manage, control and regulate the quantity, quality, flow and velocity of stormwater runoff from any property which is proposed to develop or is in the process of being developed or is fully developed, in order to prevent or mitigate- erosion and degradation of watercourses; sedimentation in ponds and watercourses; degradation of water quality and fish habitat and excess stormwater runoff onto a public road which may pose a danger to life or property or both.
CoJ - Public open spaces By-laws	Provincial	Provide an effective legal and administrative framework to ensure that the way in which the Council controls, manages and develops public open spaces is environmentally sustainable. and is in the long-term interests of the whole community of Johannesburg, including future generations and which clearly defines the rights and obligations of the public in relation to public open spaces.
CoJ - Waste management By-laws	Provincial	Ensure that waste is avoided, or where it cannot be altogether be avoided, minimized, re-used, recycled, recovered and disposed of in an environmentally sound manner; promote sustainable development and environmental justice through fair and reasonable measures for the management of waste within the Council's jurisdiction; regulate the collection, transportation, storage, disposal, treatment and recycling of waste within the Council's jurisdiction; regulate and ensure effective delivery of the municipal service and regulate the provision of commercial services through accreditation of service providers, and ensure that all municipal residents and businesses in the jurisdiction of the Council participate in the promotion of responsible citizenship by ensuring sound waste management practices within residential and industrial environments.

<p>Gauteng Provincial Environmental Management Framework: Phase Two - exclusions in terms of the NEMA, ACT 107 OF 1998 as amended in February 2016. Vol 22, March 2016, No.113</p>	<p>Provincial Department of Agriculture and Rural Development</p>	<p>The frameworks will be considered in the assessments and development of mitigation measures. The purpose of this Schedule is to –</p> <ul style="list-style-type: none"> - Identify activities in terms of section 24 (2) (c) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended, which may be excluded from the requirement to obtain an environmental authorisation;□ - Provide a process to effectively support the streamlining of the Environmental Impact Assessment (EIA) process; - Set provincial minimum standards, in terms of section 24 (2) (d) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended, that must be complied with for the activities identified for exclusion, ensuring – <ul style="list-style-type: none"> • governance of the excluded activities; • compliance to National Environmental Management Principles and duty of care, in □terms of Section 28 (1) of the National Environmental Management Act, 1998 (Act No. 107 of 1998); and • sustainable natural resource management within Gauteng Province.
<p>City of Johannesburg Open Space Framework</p>	<p>Provincial</p>	<p>Provides a policy framework for open spaces in the City linked to a GIS support tool. Development guidelines related to open spaces are contained within the Open Space Framework document to ensure the SDF and developments address key environmental impacts during the conceptualisation, design and construction phases.</p>

Other documents reviewed include the following:

- City of Johannesburg 2040 Growth and Development Strategy
- City of Johannesburg 2012-2016 Integrated Development Plan
- Gauteng State of the Environment report - 2003.
- Final Environmental Impact Assessment Report for the proposed development of a driving range in Jabavu Central (Mshengu ville) Soweto, Gauteng Province. GDARD ref no: Gaut:002/11-12/e0059. Hessa ref no: 2011; July 2012.

Table 2.1-2. The listed activities that may be triggered by the activities of the rehabilitation.

The listed activities that may be triggered by the activities of the rehabilitation are listed below.

Indicate the number of the relevant Government Notice:	Activity No (s) (relevant notice): e.g. Listing notices 1, 2 or 3	Describe each listed activity as per the wording in the listing notices:
<p>e.g. GN. R 983, 8 December 2014</p>		
<p>National Environmental Management Act (107/1998): Environmental</p>	<p>4</p>	<p>The development of a road wider than 4 metres with a reserve less than 13,5 metres.</p>
	<p>10</p>	<p>The development of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres</p>

Impact Assessment Regulations, 2014 Listing Notice 3, 04 December 2014	12	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance undertaken in accordance with a maintenance management plan.
	14	The development of- (i) canals exceeding 10 square metres in size; CO bridges exceeding 10 square metres in size; (iv) dams, where the dam, including infrastructure and water surface area exceeds 10 square metres in size; (v) weirs, where the weir, including infrastructure and water surface area exceeds 10 square metres in size; (vi) bulk storm water outlet structures exceeding 10 square metres in size;
NATIONAL WATER ACT, 2014 (ACT 27 OF 2014)	Section 21 (a):	"Taking water from a water resource"
	Section 21 (c)	Impeding or diverting the flow of water in a water course"

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

--

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	Design and operational	<ul style="list-style-type: none"> • Development of parks in earmarked zones. Different types of parks will be developed per zone, dependent on the need of the community and best rehabilitation intervention for the area. The activities include: <ul style="list-style-type: none"> - construct and demarcate picnic area with braai facilities - construct ablution facilities - construct pathways/walkways - build footbridges across the watercourses - demarcate special areas for bird watching with benches around the area and educational posters at each sitting area. - placement of benches along the walkway/pathways - placement of waste bins along the walkways/pathways and in picnic areas - position recyclable waste stations at recreational areas especially close to the entrance/exit and the picnic area with braai facilities - install playing equipment for children = see-saw; swing; merry-go-round; jungle gym - create an area for playing games for both adults and children = life-size floor games such as chess; snake and ladders; hop-scotch

		<ul style="list-style-type: none"> Implement the proposed rehabilitation interventions within the WMU with the key rehabilitation focus being on the use of techniques such as soil bioengineering methods. <ul style="list-style-type: none"> ✓ Construction of flood protection berms at areas close to the water resource ✓ Construct and install Erosion Control fences ✓ Sediment control - silt fence and gravel bags ✓ Treating footpaths ✓ Prevent overgrazing and animal trampling ✓ Invasive alien species control
2	Design and operational	<ul style="list-style-type: none"> Development of park and rehabilitation activities are the same as the proposal except the inclusion of special areas reserved for livestock grazing within the park in Zones 2 and Zone 3 to address overgrazing.
3	Design and operational	<ul style="list-style-type: none"> Development of park and rehabilitation activities are the same as the proposal except the following: inclusion of special areas reserved for livestock grazing within the park in all zones (Zone 1-4). No mulching to be added only reseeding onto topsoil covered gabions. Construct and install Gabions in Zone 2; Box gabions in Zone 1 and and gabion mattresses in Zone 2 and 3.

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

--

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:

Proposed activity (*Total environmental (landscaping, parking, etc.) and the building footprint*)

Size of the activity:

The study area occurs in communities of Soweto which bordering along the Klip- Middle Soweto Water Management Unit (WMU) – this WMU is roughly bounded by Koma Road on the south-west, Elias Motsoaledi on the West, Main Reef Road on the north and Klip Valley Road on the south east. some of the key suburbs within this WMU are the Soweto suburbs of Dobsonville, Meadowlands, Molapo, Jabavu, Jabulani, Zondi, Orlando West and Mofolo.

Jabavu Central Ext 1 : 346
Jabulani : Undefined
Mofolo Central : 1342/1184
Dube /Mofolo : 1069
Dorothy Nyembe : Undefined
Meadowlands : Undefined
Fluerhof Ext 4 : Undefined
Orlando West Ext 2 : Undefined
Orlando West extension Ext 5 : 12547/22519

Alternatives:

Alternative 1 (if any)

The size of the activity is 1080.6 ha as depicted in Figure 4.1-1 - (Locality Map ; Annexure 3 of Application form)

The study area occurs in communities of Soweto which bordering along the Klip- Middle Soweto Water Management Unit (WMU) – this WMU is roughly bounded by Koma Road on the south-west, Elias Motsoaledi on the West, Main Reef Road on the north and Klip Valley Road on the south east. some of the key suburbs within this WMU are the Soweto suburbs of Dobsonville, Meadowlands, Molapo, Jabavu, Jabulani, Zondi, Orlando West and Mofolo.

Jabavu Central Ext 1 : 346
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 Dorothy Nyembe : Undefined
 Meadowlands : Undefined
 Fluierhof Ext 4 : Undefined
 Orlando West Ext 2 : Undefined
 Orlando West extension Ext 5 : 12547/22519

Development of park and rehabilitation activities are the same as the proposal except the inclusion of special areas reserved for livestock grazing within the park in Zones 2 and Zone 3 to address overgrazing.

Alternative 2 (if any)

Development of park and rehabilitation activities are the same as the proposal except the inclusion of special areas reserved for livestock grazing within the park in all zones to address overgrazing. Mulching in Zone 2 areas only as part of the rehabilitation intervention.

Alternative 3

Development of park and rehabilitation activities are the same as the proposal except the following:
 - inclusion of special areas reserved for livestock grazing within the park in all zones (Zone 1-4).
 - No mulching to be added only reseeding onto topsoil covered gabions.
 - Construct and install Gabions in Zone 2; Box gabions in Zone 1 and gabion mattresses in Zone 2 and 3.

Ha/ m²

or, for linear activities:

Proposed activity

Alternatives:

Alternative 1 (if any)

Alternative 2 (if any)

Length of the activity:

1080.6 ha

500 ha?

1080.6 ha?

m/km

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

Proposed activity
Alternatives:
 Alternative 1 (if any)
 Alternative 2 (if any)

Size of the site/servitude:
 Master plan to provide sizes

Ha/m²

5. SITE ACCESS

Proposal

Does ready access to the site exist, or is access directly from an existing road?
 Site can be accessed by Koma Road on the south-west, Elias Motsoaledi on the West, Main Reef Road on the north and Klip Valley Road on the south east.

YES	NO
m	

A detailed site access route to the site is shown in Photo 5.1-1

If NO, what is the distance over which a new access road will be built
 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?
 If NO, what is the distance over which a new access road will be built

YES	NO
m	

Describe the type of access road planned:

The site is roughly bounded by Koma Road on the south-west, Elias Motsoaledi on the West, Main Reef Road on the north and Klip Valley Road on the south east.

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?
 If NO, what is the distance over which a new access road will be built

YES	NO
m	

Describe the type of access road planned:

The site is roughly bounded by Koma Road on the south-west, Elias Motsoaledi on the West, Main Reef Road on the north and Klip Valley Road on the south east.

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
 (only complete when applicable)

2	Number of times
----------	-----------------



Photo 5.1-1 Access route to the sites for the rehabilitation of the wetland of Zone 4.

Alternative 1 (Proposal)

6. LAYOUT OR ROUTE PLAN

The City of Johannesburg Master Plan have been used for reference to the site layout and the position of the proposed activity. The surface layout plan is provided as Appendix A. In addition for spatial localised detail, individual zones are represented in specific locality plans that should be read in conjunction with the overall layout plan. The specific zone maps are included as sub Annexures A.1, A2, A3 and A4 for each of the 4 zones, respectively.

The maps are attached as part of Appendix A as Figure 6.1-1 to Figure 6.1-5

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); (APPENDIX A: Figure 6.1-1)
- 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; (APPENDIX A: Figure 6.1-1 to Figure 6.1-4)
- the position of services, including electricity supply cables (indicate above or underground), water supply pipelines, boreholes, sewage pipelines, septic tanks, storm water infrastructure; (Figure 5.3-1)
- 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; (Figure 7.2-1 and Figure 7.2-2)
 - the 1:100 and 1:50 year flood line; (APPENDIX A: Figure 6.1-1)
 - ridges;
 - cultural and historical features;
 - areas with indigenous vegetation (even if it is degraded or infested with alien species); (APPENDIX A: Figure 6.1-1)
- 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) (Figure 4.1-1, Figure 4.1-2,)

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.

(APPENDIX A)

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.

(APPENDIX B)

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.

(APPENDIX C)

Alternative 2 & 3

6. LAYOUT OR ROUTE PLAN

The City of Johannesburg Master Plan have been used for reference to the site layout and the position of the proposed activity. The maps are attached as part of Appendix A as Figure 6.1-1 to Figure 6.1-5

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); (APPENDIX A: Figure 6.1-1)
- layout plan is of acceptable paper size and scale, e.g.
 - A4 size for activities with development footprint of 10sqm to 5 hectares;
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 - 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
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 - A2 = 1: 2000
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- 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; (APPENDIX A: Figure 6.1-1 to Figure 6.1-4)
- the position of services, including electricity supply cables (indicate above or underground), water supply pipelines, boreholes, sewage pipelines, septic tanks, storm water infrastructure; (Figure 5.3-1)
- 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; (Figure 7.2-1 and Figure 7.2-2)
 - the 1:100 and 1:50 year flood line; (APPENDIX A: Figure 6.1-1)
 - ridges;
 - cultural and historical features;
 - areas with indigenous vegetation (even if it is degraded or infested with alien species); (APPENDIX A: Figure 6.1-1)
- 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) (Figure 4.1-1, Figure 4.1-2,)

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.

(APPENDIX A)

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.

(APPENDIX B)

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.

(APPENDIX C)

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 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 times

(complete only when appropriate)

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)

Only design alternatives are proposed for the project.

1. PROPERTY DESCRIPTION

Property description:
(Including Physical Address and Farm name, portion etc.)

The study area occurs in communities of Soweto which bordering along the Klip- Middle Soweto Water Management Unit (WMU) – this WMU is roughly bounded by Koma Road on the south-west, Elias Motsoaledi on the West, Main Reef Road on the north and Klip Valley Road on the south east. some of the key suburbs within this WMU are the Soweto suburbs of Dobsonville, Meadowlands, Molapo, Jabavu, Jabulani, Zondi, Orlando West and Mofolo.

Jabavu Central Ext 1 : 346
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 Meadowlands : Undefined
 Fluerhof Ext 4 : Undefined
 Orlando West Ext 2 : Undefined
 Orlando West extension Ext 5 : 12547/22519

Specific sites and Co-ordinate's

Location	Co ordinates		
Jabavu Central Ext 1	E26 °	14 '	20.085" S
	S27 °	52 '	3.703" E
Jabulani	E 26 °	14 '	21.392"
	S27 °	52 '	27.426"
Mofolo Central	E26 °	14 '	36.118"
	S27 °	52 '	3.888"
Dube /Mofolo	E26 °	14 '	15.426"
	S27 °	53 '	16.903"
Dorothy Nyembe	E26 °	30 '	29.951"
	S27 °	52 '	50.633"
Meadowlands	E26 °	13 '	0.814"
	S27 °	55 '	95.39"
Fluerhof Ext 4	E26 °	11 '	3.888"
	S27 °	54 '	25.3"
Orlando West Ext 2	E26 °	30 '	44.39.6"
	S27 °	54 '	56.042"
Orlando West extension Ext 5	E26 °	14 '	6.544"
	S27 °	54 '	95.6"

2. ACTIVITY POSITION

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 1: (Park development, rehabilitation & special grazing areas = Zone 2 & Zone 3)

Latitude (S):

Longitude (E):

S27 ° 54 ' 56.042"	E26 ° 30 ' 44.39.6"
S27 ° 54 ' 95.6"	E26 ° 14 ' 6.544"
S27 ° 53 ' 16.903"	E26 ° 14 ' 15.426"
S27 ° 52 ' 3.888"	E26 ° 14 ' 36.118"
S27 ° 52 ' 50.633"	E26 ° 30 ' 29.951"

Alternative 2: (Park development, rehabilitation & special grazing areas = all Zones (1-4); Mulching at Zone 2 only)

S 27 ° 52 ' 3.703"	E26 ° 14 ' 20.085"
S27 ° 52 ' 27.426"	E 26 ° 14 ' 21.392"
S27 ° 52 ' 3.888"	E26 ° 14 ' 36.118"
S27 ° 53 ' 16.903"	E26 ° 14 ' 15.426"
S27 ° 52 ' 50.633"	E26 ° 30 ' 29.951"
S 27 ° 55 ' 95.39"	E26 ° 13 ' 0.814"
S27 ° 54 ' 25.3"	E26 ° 11 ' 3.888"
S27 ° 54 ' 56.042"	E26 ° 30 ' 44.39.6"
S27 ° 54 ' 95.6"	E26 ° 14 ' 6.544"
S27 ° 52 ' 27.426"	E 26 ° 14 ' 21.392"
S27 ° 52 ' 3.888"	E26 ° 14 ' 36.118"
S27 ° 53 ' 16.903"	E26 ° 14 ' 15.426"
S27 ° 52 ' 50.633"	E26 ° 30 ' 29.951"
S 27 ° 55 ' 95.39"	E26 ° 13 ' 0.814"
S27 ° 54 ' 56.042"	E26 ° 30 ' 44.39.6"
S27 ° 54 ' 95.6"	E26 ° 14 ' 6.544"

Alternative 3: (Park development, rehabilitation & special grazing areas = Zones 2 and 3; No Mulching; Specific types of gabions for each zone -install Gabions in Zone 2; Box gabions in Zone 1 and and gabion mattresses in Zone 2 and 3.

In the case of linear activities:

Alternative:

- Starting point of the activity
- Middle point of the activity
- End point of the activity

Latitude (S):	Longitude (E):
°	°
°	°
°	°

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

The 21 digit Surveyor General code of each cadastral land parcel

PROPOSAL																					
ALT. 1																					
ALT. 2																					
etc.																					

3. GRADIENT OF THE SITE

Indicate the general gradient of the site.

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5
------	-------------	-------------	-------------	--------------	-------------	------------------

4. LOCATION IN LANDSCAPE

Indicate the landform(s) that best describes the site.

Ridgeline	Plateau	Side slope of hill/ridge	Valley	Plain	Undulating plain/low hills	River front
-----------	---------	--------------------------	--------	-------	----------------------------	-------------

The study area is situated in the Middle Klip Water Management Unit (Figure 4.1-1 - 4.1.2), which in turn is located in Quaternary Catchment C22A as depicted in Figure 4.1-3. The topography of the study area is characterised by flat to gently rolling terrain. The prominent morphological features in the area are the artificial mine dumps from previous mining activities, which rise to about 50-60 metres above ground. Ground elevation ranges from 1580 metres above sea level at the southern tip of the wetland to about 1720 metres at the top of the mine dumps. Figure 4.1-4 shows the topography of the study area, as well as surface water flow directions with drainage ultimately being to the south into the Klip River.

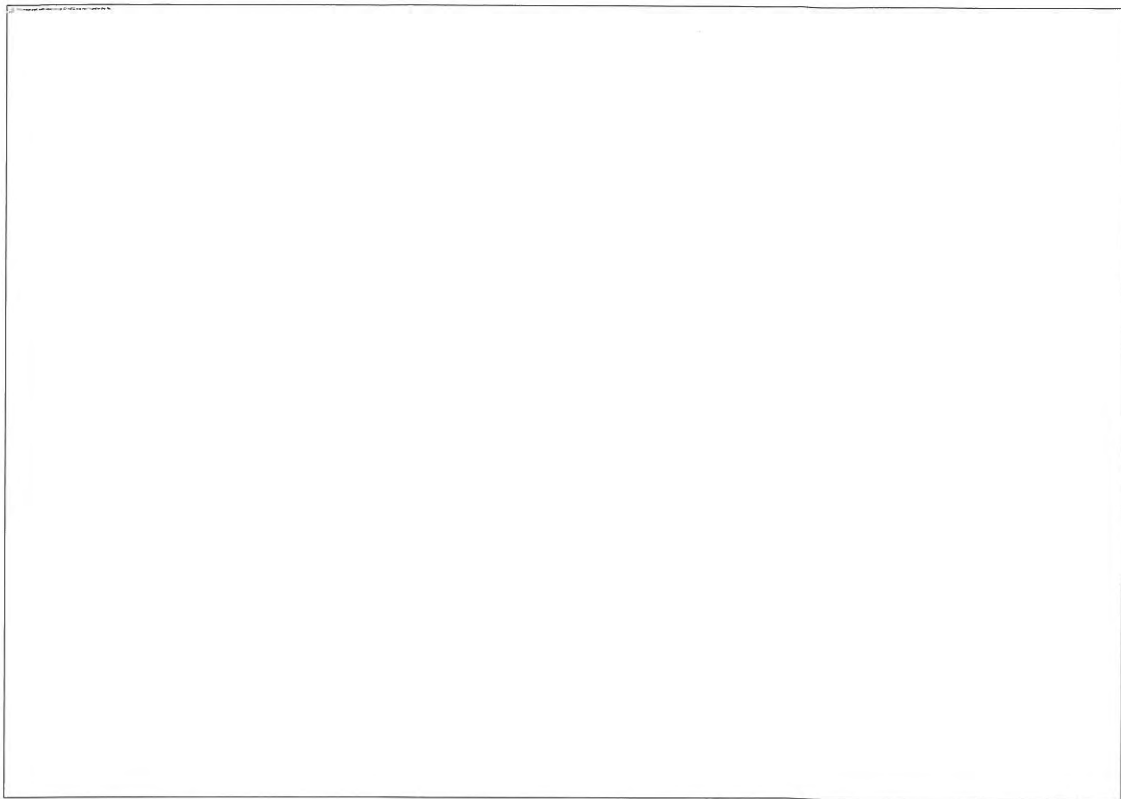


Figure 4.1-1 Location of the Study Area.

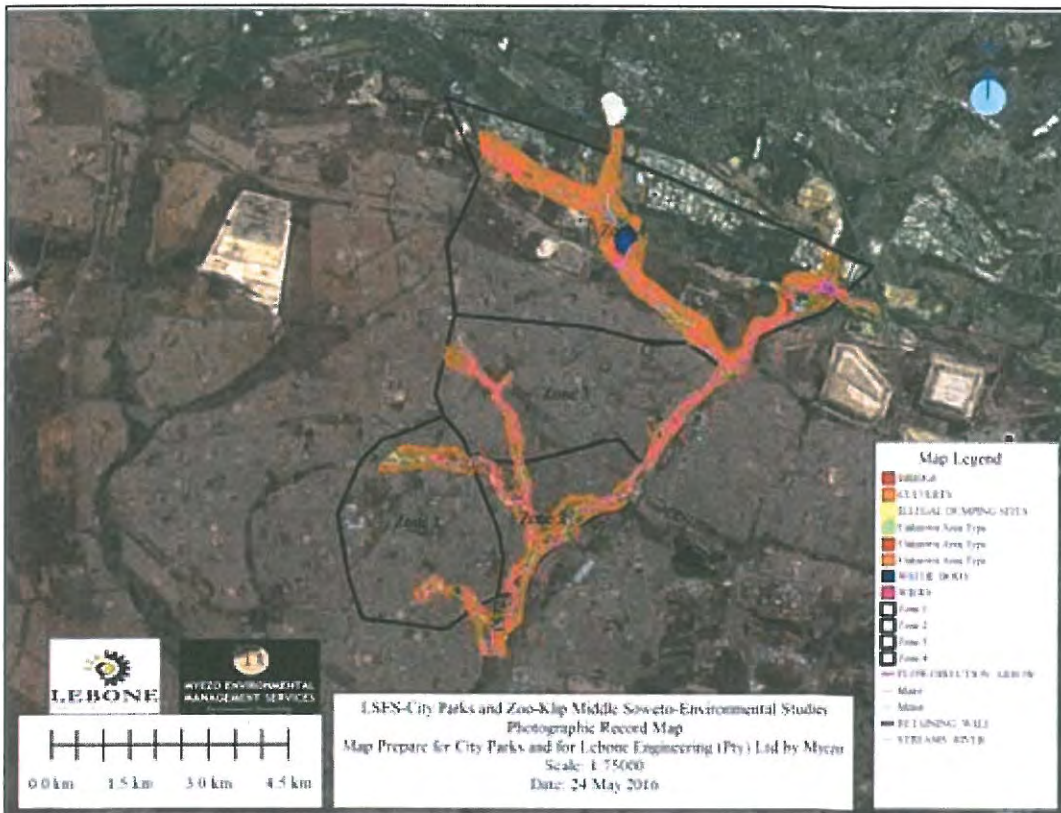


Figure 4.1-2 Extent of the Study Area.

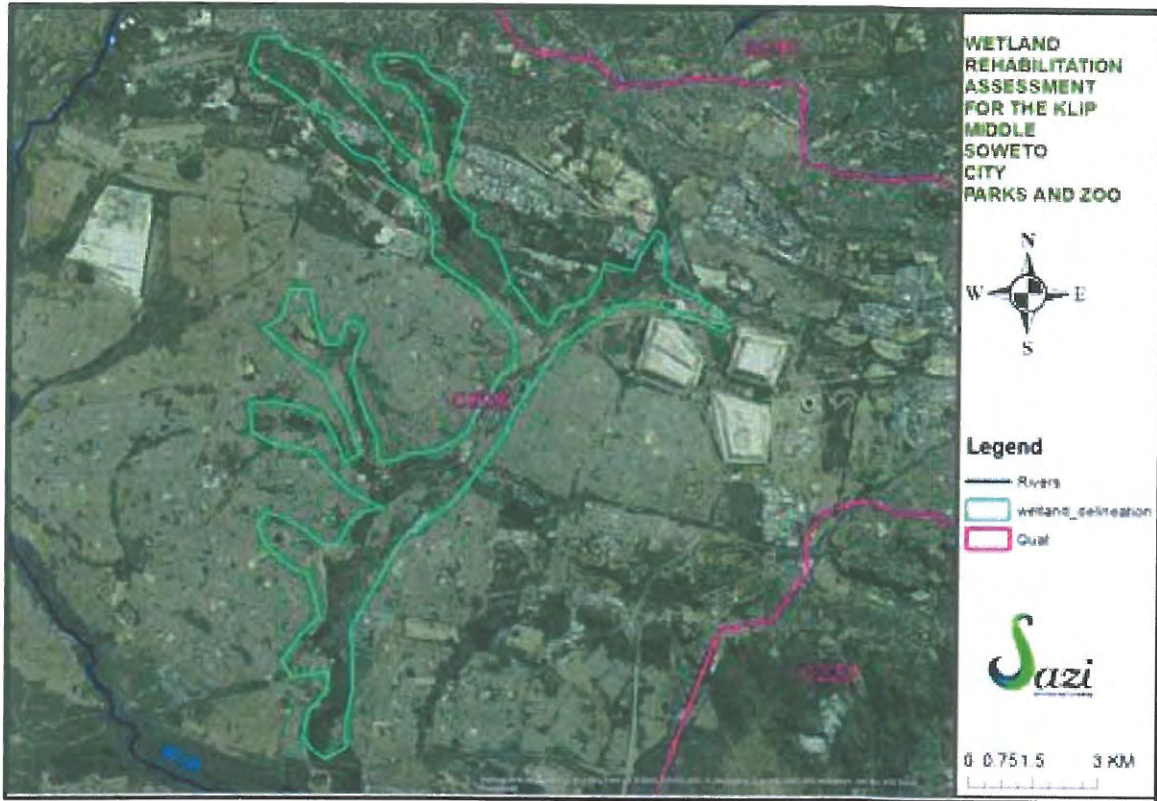


Figure 4.1-3. Study area within the Quaternary Catchment C22A.

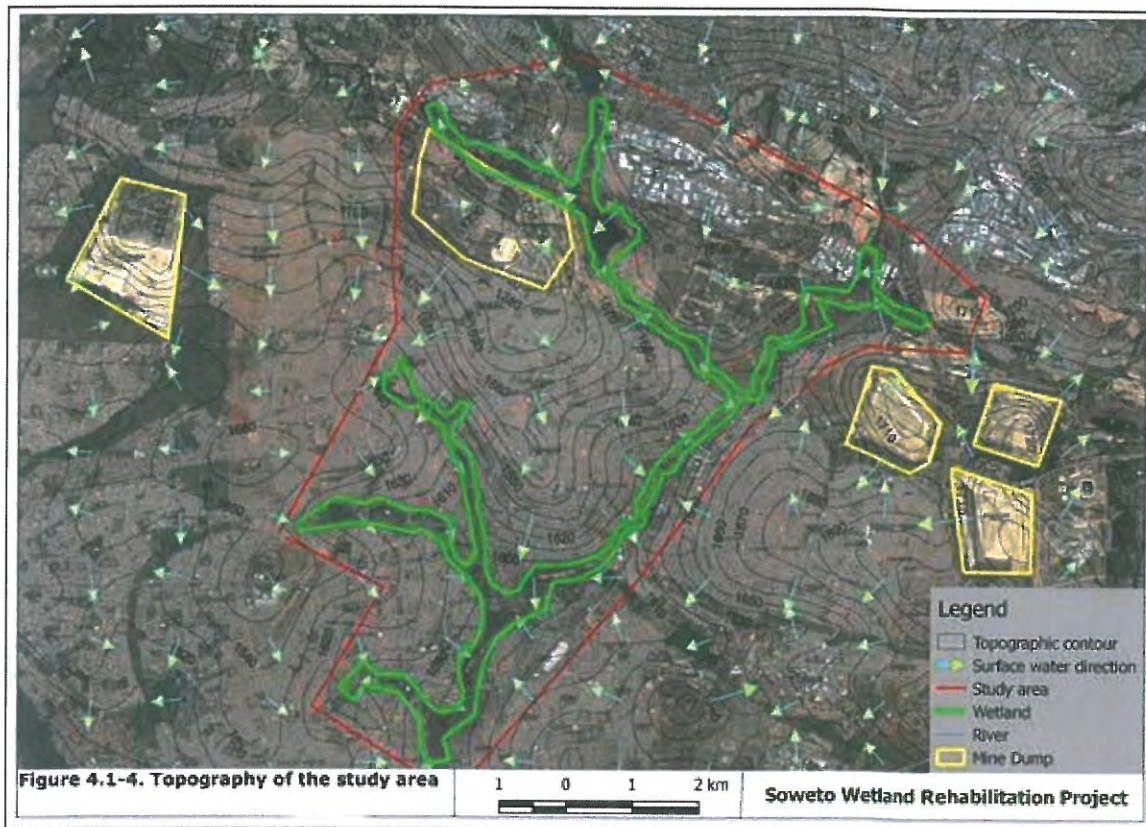


Figure 4.1-4. Topography of the study area.

5. 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)
- Dolomite, sinkhole or doline areas
- Seasonally wet soils (often close to water bodies)
- Unstable rocky slopes or steep slopes with loose soil
- Dispersive soils (soils that dissolve in water)
- Soils with high clay content (clay fraction more than 40%)
- Any other unstable soil or geological feature
- An area sensitive to erosion

YES X	NO
YES X	NO
YES X	NO
YES	NO X
YES	NO X
YES X	NO
YES	NO X
YES X	NO

5.1 Climate

Study area falls within Johannesburg which receives about 640mm rain per year, with most rainfall occurring during summer as short thunderstorms. It receives the lowest rainfall (0mm) in July and the highest (113mm) in January. The average midday temperatures for Johannesburg range from 16.60C in June to 26.20C in January. The region is the coldest during July when the mercury drops to 0.80C on average during the night. Weather charts for the study area are attached as Figure 5.1-1.

Climate over the Upper Vaal management area is fairly uniform, and the average rainfall varies between 600 mm and 800 mm per year (National Water Resource Strategy, 2004). Summer seasons are at their hottest during January with temperatures reaching 30°C. Winters are characterised by low temperatures falling below 20°C sometimes. The average annual rainfall is 700 mm with a maximum of 800 mm while the minimum is 600 mm. The site falls in a summer rainfall region with high rainfall events between November and March (Hydro-geological Map Johannesburg 2526).

The rainfall occurs mainly as showers, while thunderstorms are a common phenomenon. Winters are generally characterised by dry weather conditions. Wind direction varies from North East to North West, and the wind speed ranges between 5-10 knots.

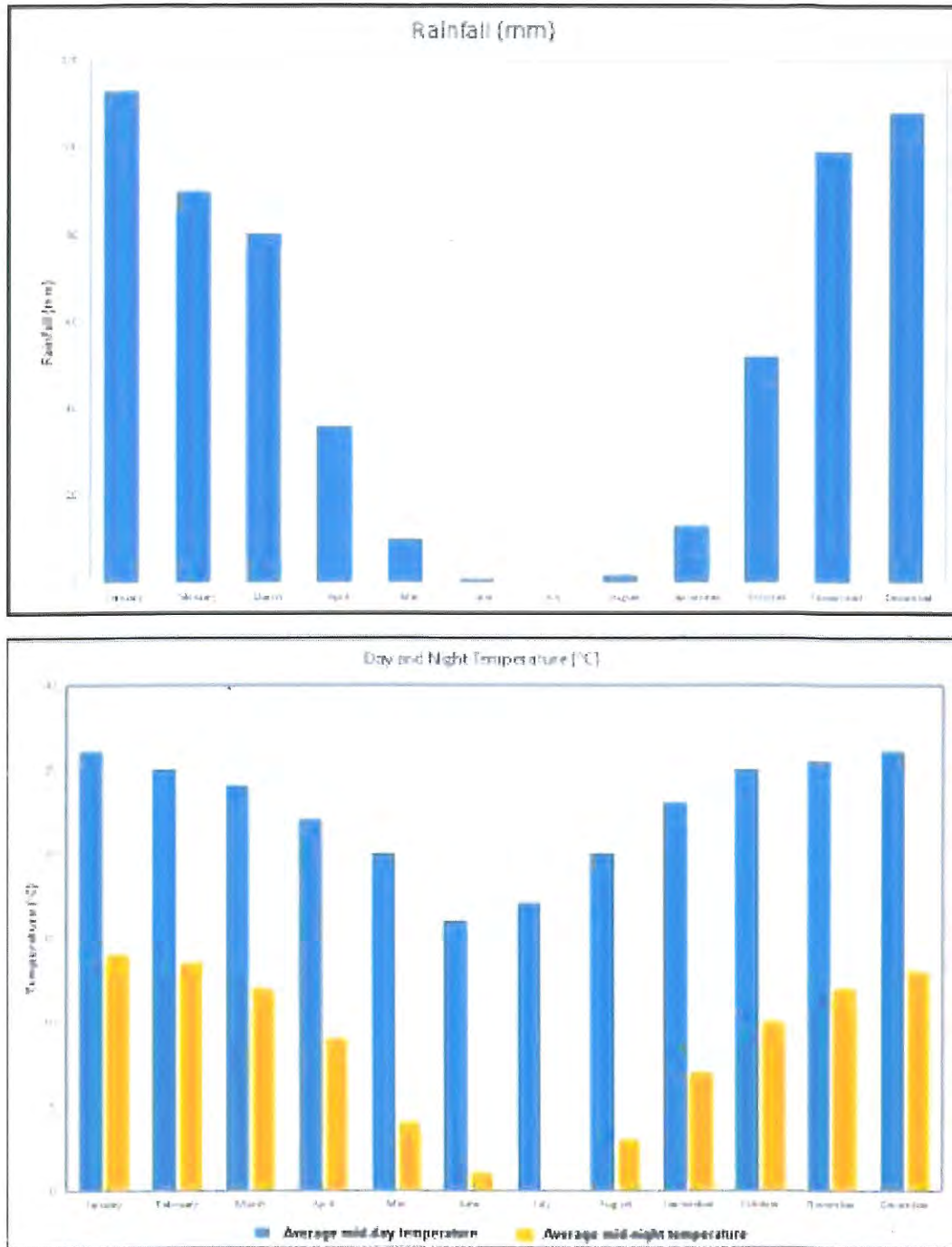


Figure 5.1-1. Weather charts for the Study Area.

5.2 Geology

The study area is underlain by predominantly both the sedimentary (shale, sandstone and conglomerate) and igneous rocks (andesite). These rocks possess low primary permeability and porosity. The Geological composition of the study area consists of oldest rocks belonging to the Archean Basement complex represented by the Halfway House granites (Figure 5.2-1). These were then followed upward by the sedimentary rocks of the Witwatersrand, then andesite intrusion of the Ventersdorp. The sequence is completed by the deposition of the Transvaal followed by the Karoo (Table 5.2-1). Locally the site is underlain by the andesite of the Ventersdorp Group in the south and quartzite, conglomerate and shale of the Transvaal Group in the northern section. These rocks have been intruded by the late Karoo dolerite dykes and sills (Photo 5.2-1).

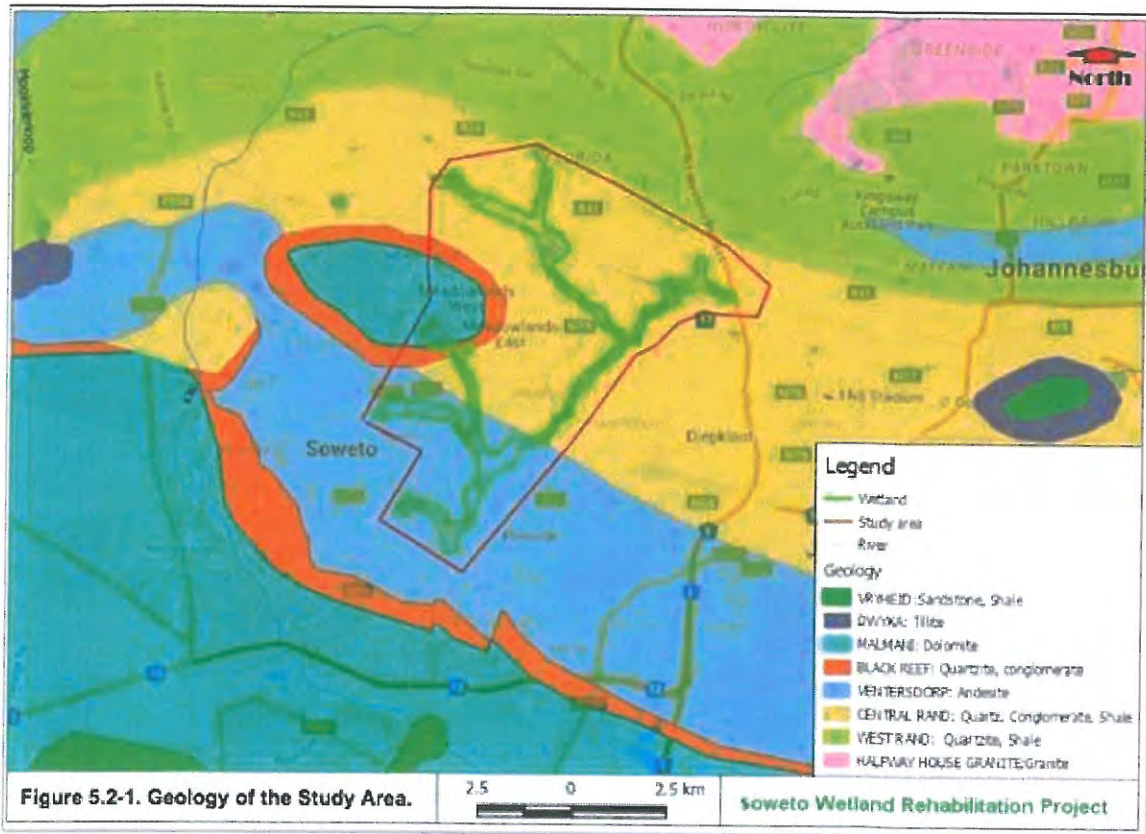


Figure 5.2-1 Geology of the Study Area

Table 5.2-1 Stratigraphical Sequence in the area

Ma	Erathem (geological period)	Lithology	Stratigraphy		
			Formation	Group	Complex: Super-group
230	Mesazoic	Dolerite	Intrusive		Karoo
570	Paleozoic	Sandstone, shale & Coal	Vryheid formation	Ecca Group	
		Tillite, mudstone, sandstone		Dwyka	
2560	Valian	Dolomite	Malamani	Chuniespoort	Transvaal
		Quartzite, Conglomerate	Black Reef		
3090	Randian	Andesite	Alanridge	Kliprivier	Ventersdorp
		Sandstone, Conglomerate		Central Rand Group	Witwatersrand Super-group
		Quartzite, shale		West Rand Group	
	Swazian	Granite, gneiss	Halfway House	Basement Complex	Basement Complex



Photo 5.2-1 Geology of the area assessed within Zone 4.

The site is characterised by predominantly carbonate rich environment that is dolomite and chert of the Chuniespoort Group of the Transvaal Super group (as described in of the 1:500 000 General Hydrogeological Map Johannesburg 2526). The dolomites of the Chuniespoort Group represent the most important aquifer in South Africa. This is due to the generally high to very high storage capacity and often highly permeable characteristics of this rock type. According to Bredenkamps et al (1995), the storage capacity of dolomitic aquifers generally varies between 1% and 5%. There is already existing drainage however majority of the drainage is blocked, resulting in less movement of water.

The continuity of the dolomite aquifer is interrupted by geological structures in the form of vertical and sub vertical intrusive dykes. These low permeability or impermeable rocks serve as barriers to the formation of compartments. The low density of surface drainage networks in dolomitic areas suggests high recharge and significant underground flow. This flow often supports high yielding spring located at the lowest surface elevation of a compartment in proximity to an impermeable boundary such as a dyke or lithological contact. Ground stability is an important consideration in establishing large scale water abstraction schemes in dolomite. The rate and extent of water level draw down is one of the critical factors in the development of ground subsidence and sinkholes where the groundwater level occurs closer to surface (less than 30 m) and where it fluctuates more than 6 m in response to pumping.

Wetlands are found in landscapes that are neither fully terrestrial nor fully aquatic, particularly where there is moisture surplus or poor surface drainage, or adjacent to water bodies where waterlogged conditions are maintained. In such areas the ground water table remains near or above the soil for most of the growing season and the dominant vegetation is adapted to wet environment (Williams & Feltmate, 1992).

5.3 Geohydrological Setting

Groundwater occurrence is generally associated with fractures and joints developed along bedding planes in former, weathering and fracturing in the later. A map of existing boreholes sourced through hydrocensus are shown in Figure 5.3-1. Contact zones between dolerite intrusions and the country rocks represent especially good aquifers due to the presence of shrinkage fractures that developed as the dolerite magma rapidly cooled on contact with the cooler country rocks. The groundwater potential in the area is classified as low; with borehole yields generally less than 2 L/s, (Barnard, 2000). However, high yields are occasionally obtained on lithological contact zones described earlier.

Groundwater recharge in the study area is estimated at 95 mm per annum. The harvest potential of the area, which indicates the maximum volume of groundwater that can sustainably be abstracted per square kilometre per annum, is estimated at 11 200m³/km²/annum (Vegter, 1995).

Groundwater occurs in solution channels and fractures occurring in the carbonate rocks of the Chuniespoort Group. According to the Drainage Regions Map of South Africa, 1999, the mean annual precipitation ranges between 600 - 800 mm. The groundwater yield potential is classed as excellent on the basis that 50% of the boreholes on record produce more than 5 l/s, with a maximum of 126 l/s. Unlike most other formations, the groundwater level in dolomitic aquifers does not necessarily follow the topography. The groundwater drainage pattern in the map area generally mimics that of surface water

5.5 Soils

The area is dystrophic and mesotrophic, with red soil not widespread in an area of 86780 hectares (Soil and irrigation research institute, Directeur; MCF du Plessis PhD Director, Land type series Map, 2626 Wes Rand).

Black Arcadia shallow soils are also indicated on the site according to Soil Colour Chart compiled by the Soil and Irrigation research institute, 1985, this soil hue is classified as 5YR 5/8. The soil type according to Soil classification: a binomial system of South Africa, 1977, fall under yellow-red Apedal B horizon. These soils may be found on all types of parent material, but less commonly on basic rock. A very moist regime is needed to produce a yellowish soil on a parent material such as basalt which has a large reserve of ferrous iron. It is commonly formed in sands, sandstones, quartzite's, shales and granite on account of lower ferrous iron reserve. The occurrence of a yellow horizon between the top soil and its soluble products could well play a role in the development of yellow horizons (Soil Classification, a binomial system for South Africa). The soil type in terms of the land types series is Bb4b. Site observations confirm that the soil is of a reddish hue.

The study area falls within the Klipspruitriviersberg Group as part of the Ventersdorp Supergroup Stratigraphy Unit. The Ventersdorp is characterised mainly of andesitic lava and tuff, quartz porphyry, conglomerate, sandstone and calcareous shale (Barnard, 2000).

5.5.1 Geotechnical factors and Soil Type

The area is said to have active, expansive or swelling soils in this region. The amount of expansion in millimetres (expressed as total soil heave) that can be expected when the moisture in the soil changes. Moisture changes can be due to seasonal changes in rainfall, or changes in the level of ground water due to abstraction, drainage changes or river modification (Mudau, 2000).

- Implication for development

The degree to which soil expands or contracts is a critical factor in the foundation design, especially of single-story residential buildings. Expansive clays, which can result in significant damage to buildings and pipelines, are probably one of the most widespread problem soils in South Africa.

- Severity class

According to the severity class from the geotechnical series map as shown below, the study area falls under Act 4, which has a moderate expansion. The heave is expected to be between 5-30 mm.

- Act 2- Active or expansive soil is present (amount of expected heave is unknown)
- Act 3- Low expansion (heave is expected to be 0-5 mm)
- Act 4- Moderate expansion (heave is expected to be 5-30 mm)
- Act 5- High expansion (heave is expected to be greater than 30 mm)

5.5.2 Permeability of soil

The permeability of soil is a measure of how easily fluids (usually water) pass through the soil and is related to the degree to which the pores or spaces of the soil are connected to each other. The permeability of the soil is geologically controlled by factors such as the shape of the mineral grains in the soil, the grain size and the manner in which the grains are held together (Mudau, 2000).

- Implication for development

The permeability of a soil is a critical factor that affects the rate at which water and dissolved contaminants can pass through, and into, the ground water. This information is critical to the siting of certain developments such as cemeteries and certain types of waste-disposal sites.

- Severity class

According to the severity class from the geotechnical series map as shown below, the study area falls under Per 4, which has a high permeability.

- Per 2- Low permeability ($<4 \times 10^{-4}$ - 9×10^{-10} cm/s)
- Per 3- Medium permeability (4×10^{-4} - 4×10^{-6} cm/s)
- Per 4- High permeability (4×10^{-4} cm/s)

The Figure 5.5.1 is based on the two areas of behavioural activity namely the Permeability and activeness, swelling of soil in the area.

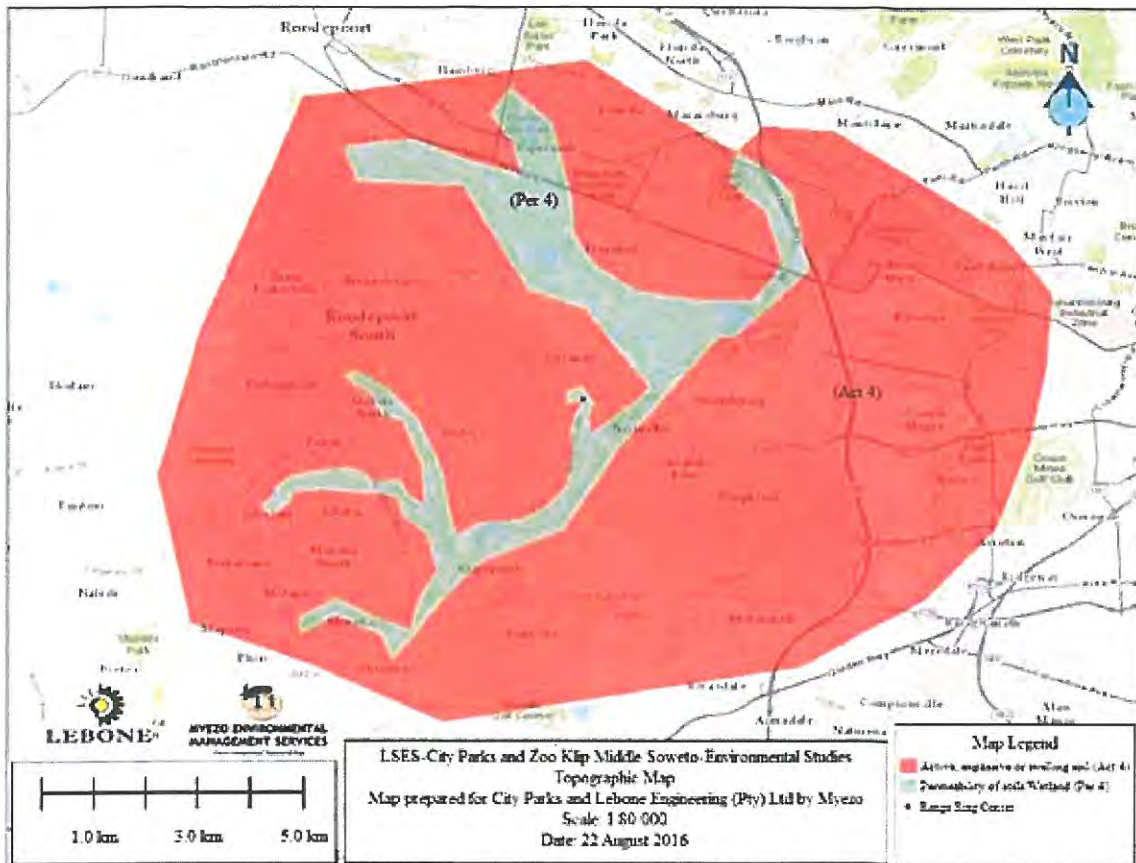


Figure 5.5-1. The Geotechnical Map of the Study Area.

(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):

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):

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):

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

5.6 Hydrological Setting

The focus of the Hydrological impact assessment for the Klip River Wetland system was along the Lenasia and Soweto Area. The detailed site investigation was conducted on 19 April 2016 for an understanding of site conditions and collection of water samples in Klip Middle Soweto WMU as part of the study area. Suitably scaled topographical maps were used to delineate the relevant catchments, which may be impacted on by the proposed activities. The following GIS information was used:

- 1:50 000 Topographical maps (2627bb, 2627bd, 2628aa & 2628ac), Raster as well as Vector;
- Site Layout Map (*.kmz); and
- Quaternary catchment boundaries.

A holistic approach in the assessment was followed whereby the project area was analyzed and compared against greater Water Management Areas (WMAs) and Quaternary Catchment Areas. A Desktop Assessment was conducted looking at existing hydrological information that was reviewed and assessed for relevance to the study area. A site visit was also conducted in order to obtain an understanding of the hydrology in and around the site. Due to the nature of the water resources, flow was observed during the assessment phase. Therefore, water quality samples were collected. The assessment process followed included:

- Visual assessment of the site and obtaining an understanding of the hydrological conditions;
- Plotting of spatial data to assess hydrological characteristics;
- Building different computer models (for different applications) that represent the site as accurately as possible; and
- Analysing the models in order to obtain the most desirable outputs and deliverables.

In South Africa there are about 5 most common different hydrological calculation methods that can be used to calculate flows and drainage, they are:

- Rational method
- Alternative Rational method
- Unit Hydrograph method
- Standard Design Flood (SDF) method
- Empirical method

For this study, the Unit Hydrograph Method was selected as the most reliable method based on the size of the catchment as well as the reliability of input data. In order to provide site specific storm water management measures, five (5) site specific catchments were delineated (Figure 5.1-3).

5.6.1 The extent of the study area

The scope of the project covered under this report, focuses on one of the 18 WMUs identified by the CoJ Municipality, namely the Klip Middle Soweto WMU. Environmental studies on six other WMUs project are being conducted simultaneously with this project. The COJ previously conducted environmental studies on WMU's in order to identify environmentally impacted areas. This project on the WMU is now affording a continuous improvement opportunity to have a working programme of managing these sensitive environmental features. The extent of the study area covered is within several townships of Soweto namely Orlando, Meadowlands, and Mofolo, and with major parks such as Orlando West, Dorothy Nyembe, and Thokoza Parks that are along the wetland river system

5.6.2 Potential Impacts

The Klip Middle Soweto WMU is within the urbanized area of Soweto that is affected by expansion of urban development's having some negative impacts on the riverine systems. Potential Impacts from Klip Middle Soweto wetland system along the Klipspruit and its tributaries are summarised as follows:

- Deterioration of water quality (Photo 5.1-4; Photo 5.1-5)
- Change in flow regime (Photo 5.1-6)
- Increase in Hydrological Yield
- Erosion/sediment transport (Photo 5.1-7)

5.6.3 Water quality current status

The findings indicate that water quality from the Klipspruit and its tributaries is of poor quality on average and is not suitable for domestic use purposes. Indicator variables of pollutants from various sources were identified in the Laboratory analysis report. Activities which impacts negatively on surface water can be categorised as follows:

- Illegal Domestic Waste Disposal (Photo 5.1-8 and Photo 5.1-11);
- Stormwater from urban areas and Sedimentation;
- Industrial Activities like mining;
- Informal settlements without services like Sewage and Domestic Waste Disposal Systems;
- Blocked sewer lines and failing waste water treatment plants.

5.6.4 Summary of Findings

The findings indicate that water quality from the Klipspruit and its tributaries is of poor quality on average and is not suitable for domestic use purposes. Indicator variables of pollutants from various sources were identified in the Laboratory analysis report. Activities which impacts negatively on surface water can be categorised as follows:

- Illegal Domestic Waste Disposal;
- Stormwater from urban areas and Sedimentation;
- Industrial Activities like mining;
- Informal settlements without services like Sewage and Domestic Waste Disposal Systems;
- Blocked sewer lines and failing waste water treatment plants.

5.6.5 Recommendations

In order to reduce the impact on surface water resources, certain measures have been proposed by the specialists. In view of the above findings, the following recommendations are made:

- Removing the siltation in blocked culverts;
- Regular maintenance of the culverts crossing the river system.
- The silted up river banks must be restored to mimic the original cross sections;

- Removal of sedimentation/siltation at the river banks in such a manner that it blends with the surrounding natural area. This will reduce soil erosion and improve natural re-vegetation;
- Improvement of waste collection and disposal at the communities to alleviate illegal disposal of waste;
- Construction of flood protection berms at areas located close to the water resource;
- Continuous Water quality monitoring must be undertaken and action/corrective measures must be implemented in order to protect the water resources;
- Conduct audit to assess the sewage design capacity and treatment plants infrastructure if they are suitable for the current population Soweto is having;
- Implement an educational programme for the people of Soweto about importance and value of wetlands and riverine systems;
- Actively enforce restrictions on dumping in wetlands and riverine systems; and
- Establish wetland monitoring programme to assess the wetland state after rehabilitation.

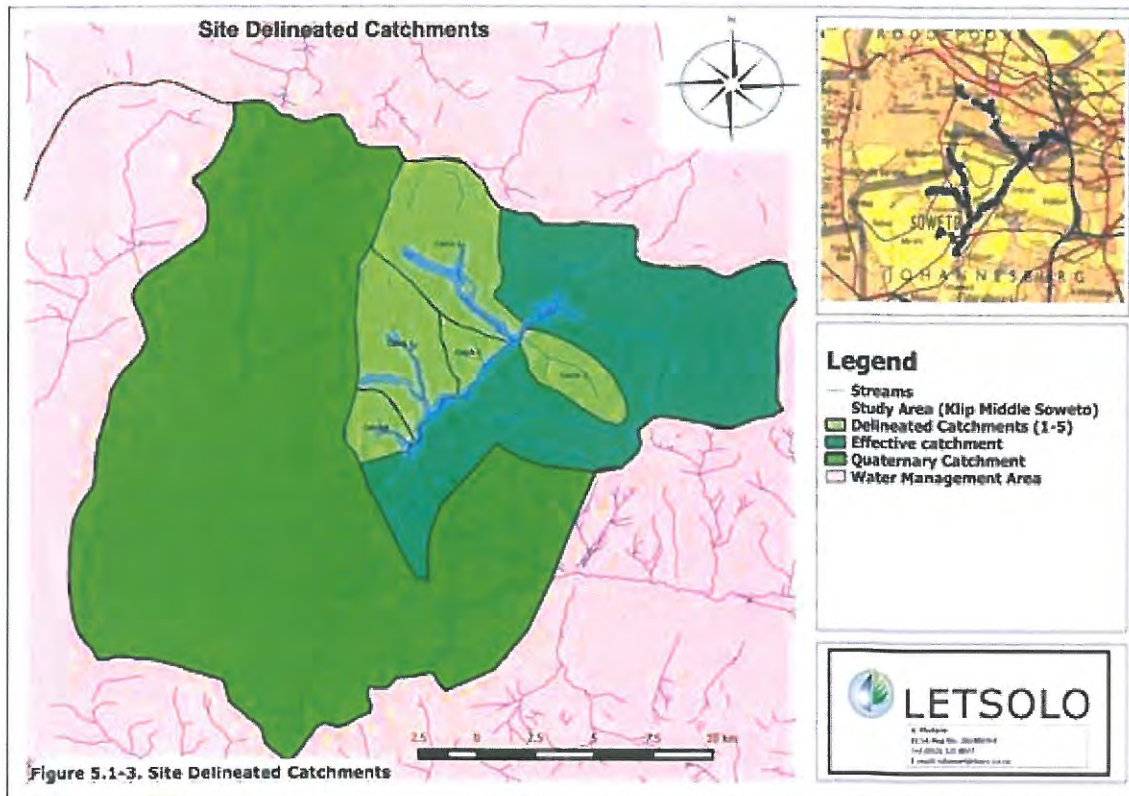


Figure 5.1-3 Site Delineated Catchments.



Photo 5.1-4. Small stream located downstream of the Mining slime dam in Zone 4.



Photo 5.1-5. Algal bloom forming in wetland at Dorothy Nyembe Park in Zone 3.



Photo 5.1-6. Round culverts blocked with litter in Thokoza Park in Zone 1.



Photo 5.1-7. Sedimentation within the wetland section in Klipspruit Valley Road to Chris Hani Road section of WMU in Zone 2.



Photo 5.1-8. Solid Waste Disposal along river near Orlando West Park in Zone 2.



Photo 5.1-9. Solid waste dumping at stream 3 within Dorothy Nyembe Park in Zone 3.



Photo 5.1-10. Illegal dumping along the dam in Zone 4, WP 923.



Photo 5.1-11. Rubble waste dumped along the dam in Zone 4, WP 924.

6. AGRICULTURE

Does the site have high potential agriculture as contemplated in the Gauteng Agricultural Potential Atlas (GAPA 4)?

YES	NO
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Please note: The Department may request specialist input/studies in respect of the above.

Study area is located in a predominately residential area in Soweto with the northern section consisting of old mine dumps and industry. Soweto is known as the most populous black urban residential areas with both formal and informal settlements. A few examples of informal subsistence agriculture (Photo 6.1-1) and poultry farming (Photo 6.1-2) within Zone 4 of the study area were observed during the site visits.



Photo 6.1-1. Informal subsistence agriculture within Zone 1 of the study area.



Photo 6.1-2. A formal Poultry farm within Zone 1 of the study area.

7. GROUNDCOVER

To be noted that the location of all identified rare or endangered species or other elements should be accurately indicated on the site plan(s).

Indicate the types of groundcover present on the site and include the estimated percentage found on site

Natural veld - good condition % =	Natural veld with scattered aliens % =	Natural veld with heavy alien infestation % =	Veld dominated by alien species % =	Landscaped (vegetation) % =
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Sport field % =	Cultivated land % =	Paved surface (hard landscaping) % =	Building or other structure % =	Bare soil % =
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Please note: The Department may request specialist input/studies depending on the nature of the groundcover and potential impact(s) of the proposed activity/ies.

Are there any rare or endangered flora or fauna species (including red list species) present on the site

YES	NO X
-----	------

Specialist study conducted on biodiversity did not find any red list species however there are threatened grass species found. Report attached as Appendix G.3.

If YES, specify and explain:

Are there any rare or endangered flora or fauna species (including red list species) present within a 200m (if within urban area as defined in the Regulations) or within 600m (if outside the urban area as defined in the Regulations) radius of the site. Specialist study conducted on biodiversity did not find any red list species however there are threatened grass species found. The full detailed report is attached as Appendix G3.

YES	NO X
-----	------

7.1 Biodiversity/Vegetation

7.1.1 Summary of Findings:

The study entailed the assessment of sensitive features present within and around the proposed development area including the compilation of a full plant and fauna species list. The sensitive habitats present in the study area such as wetlands and rivers were also noted and recorded on a GPS.

It was observed during the site visit that the study area is mostly covered by grass, shrubs, tall trees, and weeds (Photo 7.1.1-1). According to the Vegetation Map of South Africa, Lesotho and Swaziland, 2005, compiled by South African National Biodiversity Institute (SANBI). The site falls under the grassland biome (Mucina & Rutherford, 2006) unit of Albany thicket, Soweto Highveld grassland. Three vegetation types occur and they are; Tsakane Clay Grassland, Carleton Dolomite Grassland and Soweto Highveld Grassland.

According to the Gauteng Conservation Plan (C-Plan) for 2014, the study area lies within both a Critical Biodiversity Area and an Ecological Support Area (Figure 7.1.1-1), which means that even though no red data species or threatened species were observed by the Specialist study on biodiversity during the time of the assessment, due diligence and care must be undertaken to identify species of importance that may occur in the area at any given time. There were no species found on the Gauteng list of threatened birds or plant species identified from the site earmarked for rehabilitation and development of parks. (Sazi, 2016).

There were no species found on the Gauteng list of threatened birds or plant species identified from the site earmarked for rehabilitation and development of parks. A majority of plant species identified from the site were alien species (Photo 7.1.1-2; Photo 7.1.1-5; Photo 7.1.1-6). A total of 64 species were recorded during assessment of which 20 are declared as weeds or invader plants. The proportion of exotic and declared weeds or invader species is high (31%), a reflection of high levels of disturbance and habitat transformation in the study area. A few plant species with medicinal properties were identified and it is important that they are closely monitored and their harvest /use is in a sustainable manner.

In terms of fauna, mostly household kept domestic animals were identified and the reason could be the increased number of alien plant species has played a role in the decrease of other wild indigenous animal species that used to live within the study area before its transformation into a highly populated urban area. A diversity of avifauna species were identified (Photo 7.1.1-3- Photo 7.1.1-4) during the site assessment along the Klipspruit river and the associated wetland areas. A few species of invertebrates specifically butterflies were observed on the site. No red data species or species of conservation value were observed on the site during the assessment.

The study area falls within the Tsakane Clay Grassland of South Africa and its classified as an Endangered Grassland Vegetation type. There were three ecosystem types identified within the study area; Critical (CR); Endangered (EN) and Vulnerable (VU). Due to the existence of these three ecosystem types, the study area is regarded as a High Sensitive Area in terms of Biodiversity levels especially due to its wetland river system (Figure 7.1-2). According to the NFEPA, the study area contains wetland areas; the area has a highly polluted river (Klipspruit River) and wetlands; constitutes the Endangered Tsakane Clay Grassland; indigenous vegetation dominant despite the presence of alien invader species and the river provides habitat for a variety of indigenous Avifauna species.



Photo 7.1.1-1. *Acacia karoo* (sweet thorn) observed on the temporary zone of the wetland within the study area.



Photo 7.1.1-2. Vegetation types observed within the study area.



Photo 7.1.1-3. Bird species observed during site visit of the study area.

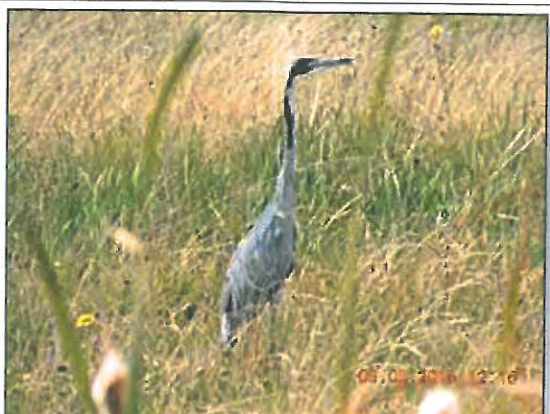


Photo 7.1.1-4. Example of Avifauna observed at the site such as *Ardea herodias* (Blue heron).



Photo 7.1.1-5. Stands of *Tagetes minuta*, *Ipomoea purpurea* and *Ipomoea carnea* (weeds and alien invasive species) on seasonal zone of wetland at Klipspruit Valley Road section of WMU.



Photo 7.1.1-6. Alien invasive species in permanent zone of wetland at at Moroka Dam section of WMU.

7.1.2 Recommendations

A Biodiversity Management plan is a necessity to focus on flora and fauna management and rehabilitation of the wetland as vegetation and habitat to the species living in the wetland.

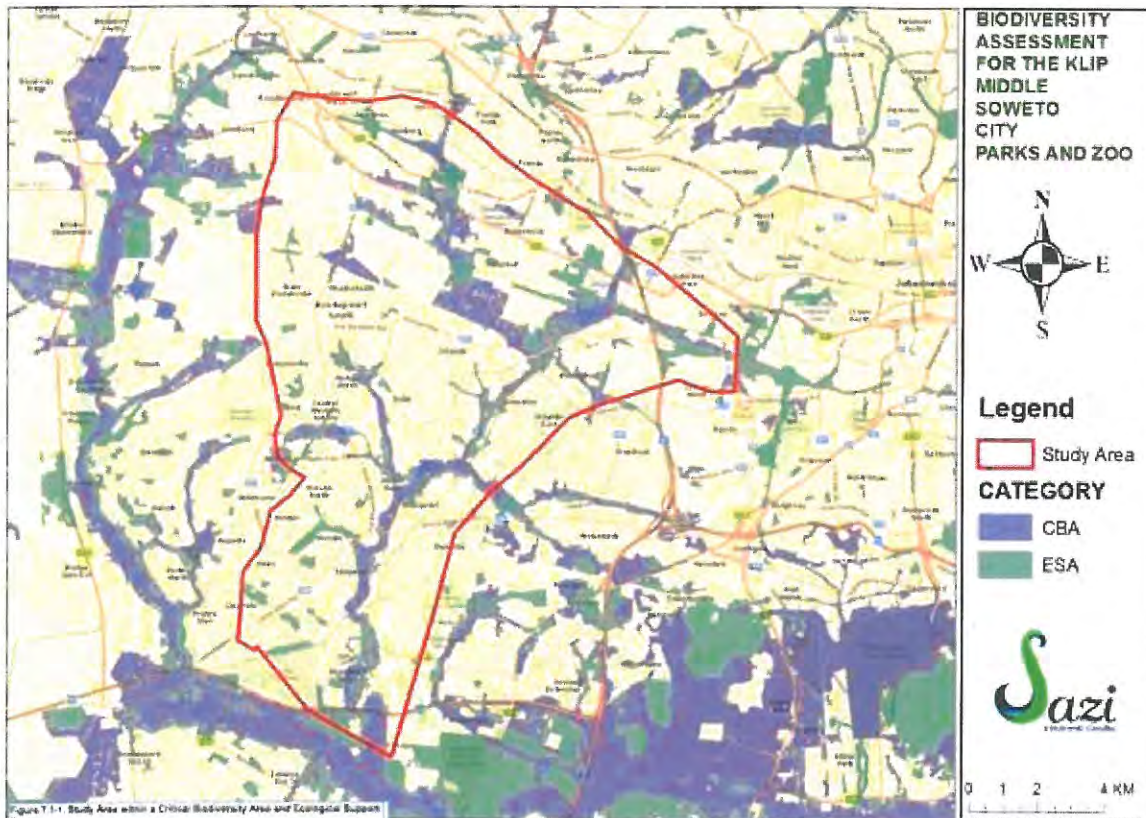
- Care must be taken when eradicating the alien and invader plants in the area
- Special care must be taken when dealing with the indigenous species, no indigenous species must be removed from the area so as to enhance a near-healthy status ecosystem after rehabilitation.

- As part of the wetland rehabilitation programme and implementation the following management objectives were recommended:

The findings from the Biodiversity assessment illustrated and described the fauna and flora of the Klip-Middle Soweto Water Management Unit and the impacts on the river, wetlands and biodiversity. The major impacts on the wetland and river vegetation were found to be illegal dumping due to over population, overgrazing and trampling by livestock, unsustainable reed harvesting, erosion, gabion collapse and sedimentation among other impacts. The report has also included rehabilitation methods that can be used to re-establish vegetation and for the recovery of the system as a whole. In order for all the rehabilitation methods described to successfully work, follow up maintenance is crucial. Three categories of solutions were suggested and described in this report i.e. heavy systems (including concrete structures such as gabions and river mattresses), light systems (including erosion control fences, treating footpaths with mulches), and soil bioengineering techniques (use of a variety of plant species without any inert materials). Of the rehabilitation techniques described, vegetation can reduce any conditions causing slope and river bank instability and erosion in general. Lastly, rehabilitation measures must be suitable for animal and plant communities so as to ensure that a full rehabilitation of our natural ecosystems can occur.

Proposed management plan objectives are:

1. To promote the recovery of indigenous vegetation, to ensure that each indigenous species persists in the long term within the wetlands of Klipspruit;
2. To reduce the current levels of threats and risks to the biodiversity of the Klipspruit wetlands;
3. To improve and maintain the extent of indigenous vegetation, including quality, functionality and connectivity for priority species in the Klipspruit;
4. To ensure no indigenous species or ecological communities become threatened;
5. To improve the baseline information of biodiversity along the Klipspruit River and associated wetlands; and
6. To inform and encourage community support in the implementation of the plan.
7. To promote sustainable reed harvesting



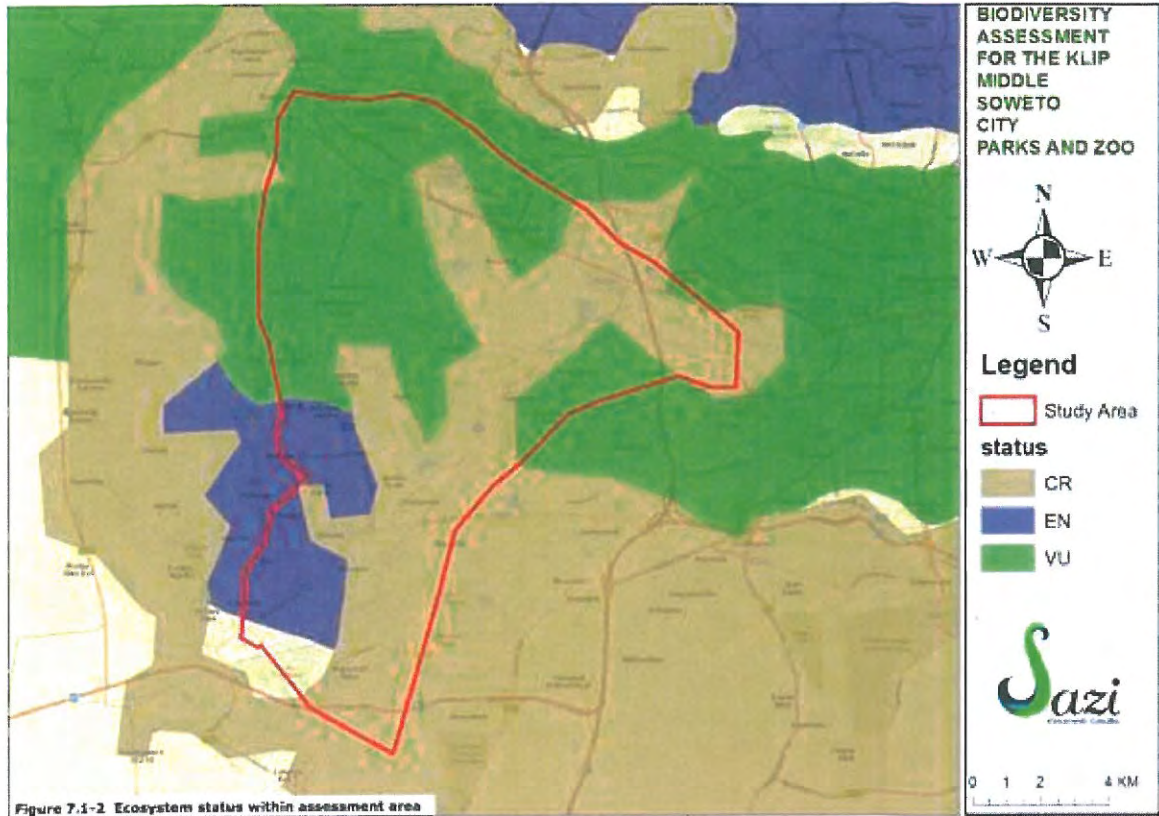


Figure 7.1-2. Ecosystem status within the assessment area.

Are there any special or sensitive habitats or other natural features present on the site?

YES X	NO
-------	----

If YES, specify and explain:

The study area falls within a wetland system and the details of the assessment of the sensitive area is provided in Section 7.2 below.

7.2 Wetland Assessment study confirmed wetland at these sites:

7.2.1 Summary of Findings:

The study area falls within C22A quaternary catchment of the Upper Vaal Water Management Area (Figure 7.2-1). The Klip River and its tributaries, drains into the Vaal River. This catchment consists of a number of constructed dams, the Fleurhof and the Moroka dam are the two dams located within the study area. The Klipspruit River of the Klip-Middle Soweto WMU consisted of a channeled valley bottom wetland associated with the Klipspruit River itself. The Klipspruit wetland furthermore consisted of drainage lines that formed channeled valley bottom wetlands. The area assessed had a total number of four wetlands assessed all draining into the Klipspruit River. The channeled valley bottom wetland type is mostly associated with a single stream or a river and its functions include soil erosion control as well as flood attenuation, respectively. Four zones of wetlands were demarcated within the study area, Zone 1, Zone 2, Zone 3 and a CVB wetland as described in Table 7.2-1 and depicted in Figure 7.2-2.



Figure 7.2-1 Catchments and main rivers within each management unit.

Table 7.2-1. Identified wetland types and site co-ordinates

Wetland type	Site Coordinates
Channel Valley Bottom (CVB)	The portion of the Klip-Middle Soweto CVB wetland assessed was located from the Orlando West Township to Kliptown in the south of Soweto. The wetland starting point was at 26°13' 52.32"S, 27°55' 38.17"E coordinates. This wetland was located close to the Orlando West Park and opposite the Orlando stadium across the Klipspruit Valley main road.
Zone 1	Zone 1 is a drainage line that covers an area of 32ha in size and has since created a CVB wetland. The assessed area was located in Rockville and incorporated two prime attraction areas, the Moroka dam and Thokoza Park.
Zone 2	Zone 2 was an area of approximately 22ha in size stretching from Orlando West to Jabavu 27 ° 52 ' 3.703"S, 26 ° 14 ' 20.085"E.
Zone 3	A channeled valley bottom wetland was also assessed in Zone 3. This wetland was located in Diepkloof Soweto (-26.218953S; 27.923655E). The Fleurhof dam also formed part of zone 3 at coordinates -26 12' 11.88"S, 27 54'29.91"E.

Wetland ecological health status was assessed by considering impacts to wetland hydrology, geomorphology and vegetation. The impact scores based on the level 1 wet health assessment was considered critical and ranked 9.0 impact score for CVB wetland, Zone 1 and Zone 3. Zone 2 is reported to have ranked a 2.0 impact score and was considered to have a moderate hydrological health status. This was the least impacted wetland compared to the others wetland assessed.



Figure 7.2-2 Wetland types assessed in the Klip-Middle Soweto.

Based on the impact scores summarized above, it is evident that the wetland systems are modified and highly impacted. From the geomorphological assessments done, the CVB scored 4.9 and experienced large modification due to sedimentation, siltation, reduces roughness and gullies within the wetland which means that the threat posed could be expected to reduce wetland integrity by approximately 50%. Zone 1, 2 and 3 scored between 2.3 and 3.4 which makes them moderately modified in terms of health category ranking.

7.2 Recommendations

Due to the health of the Klipspruit River and its associated wetlands, extensive rehabilitation is expected in order to improve the state of the wetland. In order to successfully implement the rehabilitation plan, focusing the rehabilitation strategy on individual HGM units (Zones of the Klipspruit wetland), will improve the health of the wetland since impacts to wetland zones vary with each HGM (Photo 7.2-3 to Photo 7.2-6).



Photo 7.2-3. Cut river bank caused by stream meandering within the CVB wetland section.



Photo 7.2-4 Artificial dam (Moroka dam) at Zone 1 of the CVB wetland.



7.2-5. Heap of livestock Carcasses deposited and burnt on the wetland zones at Zone 3 CVB wetland. Photo



Photo 7.2-6. Sedimentation and alien invasive species in the wetland zone at Zone 2 CVB wetland.

The Klipspruit wetland which is a Channeled Valley Bottom wetland consists of some ecological functions which include biodiversity support due to the presence of the riparian habitat. However, no rare or red data species were identified in this area. The Klipspruit wetland is considered **critical** based on the ecological importance and sensitivity assessment.

Recommendations

Based on the impacts identified, the rehabilitation plan for the Klip-Middle Soweto WMU will include but not limited to; removal of alien invasive species; re-vegetating of indigenous vegetation; erosion control measures (gabions, berms, weirs); reduction of illegal dumping into the wetland; implementation of correct management of runoff and stormwater management; stabilising sediment movement, etc.

The proposed rehabilitation activities include:

- Mulching of slopes and banks (Stabilisation of slopes using geotextile; seeding slopes to get them ready for mulching; Harvesting of trees for mulching, Layering slopes with mulch)
- Installation of erosion control fences
- Stone Gabions construction and installation
- Installation of River mattress
- Sediment control using silt fence
- Sediment control using gravel bags
- Treating footpaths using organic mulch
- Preventing overgrazing of wetland vegetation and animal footpaths (rotational grazing)
- Invasive alien species control
- Bank stabilisation using Soil bioengineering techniques (establishing a dense cover of soil protecting plants)

- Addressing illegal dumping through river clean ups (clearing of debris in water, clearing of blocked culverts and more)
- Preventing unsustainable reed harvesting

Table presents the rehabilitation activities and the mitigation measures to be implemented during the different phases of the project. The positions within Zones where the rehabilitation interventions will be implemented are presented in Figure..... (Locality Map - Annexure 3 of Application Form).



Photo 7.2-7 Current degraded status of wetland



Photo 7.2-8 Current degraded status of wetland



Photo 7.2-9 Current degraded status of wetland - rubble dumping.



Photo 7.2-10 Current degraded status of wetland - dam and highly disturbed bare land.

The study area is characterised by dense wetlands, small deep cut streams and generally degraded land as depicted in Photo 7.2-7 to Photo 7.2-10.

The proposed rehabilitation intervention involves various activities that are recommended at various sections of the Zones of the wetlands as described in detail in Table. 4.1-1 and depicted in the Maps and the photos 7.2-11 to Photo 7.2-16 below:



Photo 7.2-12 Gabion baskets can be used for bank stabilisation.

Photo 7.2-11 Various sections on the Klipspruit Valley Road to Chris Hani Road are eroded and need gabion support.



Photo 7.2-13 The Jabavu section also has various points needing gabion structures.



Photo 7.2-14 Box gabions can be used to stabilise river banks.

For example, the WMU sections in need of gabion structures for soil erosion control



Photo 7.2-15 Gabion collapse and erosion at Dorothy Nyembe Park.



Photo 7.2-16 Gabion mattresses can be useful at this particular slope as it is slanting.

In the publication of the CoJ, In the Loop, Issue 26 published in April 2016, the municipality outlines various achievements and challenges they have encountered as a municipality. As part of their environmental management strategy, they have identified a need for the rehabilitation of the Braamfontein Spruit that is said to be the longest river in Johannesburg and one of the most important waterways in Johannesburg, which originates in Parktown and eventually joins the Jukskei River. The Acting Managing Director of Johannesburg Roads Agency (JRA), Mr Mpho Kau shared the concerns of the residents about the environmental degradation and the close proximity of urbanisation to the Spruit including the implications on their health and safety within the area. In order to address the concerns raised, the JRA identified the rehabilitation of the Braamfontein Spruit as a priority project that can be used as one of the lessons learnt in addressing future interventions in other river catchment areas experiencing similar challenges of soil bank erosion.

Source: City of Johannesburg, *In the Loop*, Edition 26. Published April 2016.

The City of Johannesburg (CoJ) City Parks and Jhb Zoo also recognise the importance of wetland rehabilitation and in June 2016 they have developed a Master Plan Framework for the Upper Klipriverine area, Middle Soweto Water Management Unit with the assistance of Silver Horns Consulting. The CoJ Klipspruit and Soweto Rehabilitation and Development Master plan has identified key issues within the wetland area and also proposed response methods to address the impacts identified as follows:

<u>Issue</u>	<u>Response</u>
<p>EROSION Erosion along the river banks is an issue throughout the study area</p>	<ul style="list-style-type: none"> • Re-shape the river • Repair storm water outlets • Create dissipation / attenuation structures at storm water outlets • Protect / rehabilitate the riverine zone as a buffer area
<p>ECOLOGICAL DEGRADATION Reeds and alien invasive encroachment by alien invasive vegetation is prevalent throughout the study area. Dense sections of reeds also pose a security risk to neighbouring communities</p>	<ul style="list-style-type: none"> • Institute eradication and monitoring plan • Rehabilitate cleared areas • Improve habitat capacity of the river □systems
<p>ILLEGAL DUMPING Illegal dumping and washing down of waste in and along the river, as well as associated storm water channels</p>	<ul style="list-style-type: none"> • Institute major clean-up□ • Create waste collection points and establish collection system • Install waste traps in- and off-stream and establish a collection system
<p>PUBLIC SAFETY Flooding occurs where urban development has resulted in increased storm water runoff Localised flash flooding and polluted watercourses are a direct public health and safety risk, especially for children who cross or play in the vicinity of the river</p>	<ul style="list-style-type: none"> • Improve attenuation capacity of all river systems • Signage needs to be included in all park areas • Pedestrians should be encouraged to utilise pedestrian bridges when crossing the river • Formalise new crossings where pedestrian movement requires
<p>CONNECTIVITY Access to and within the open space system is difficult overall, due to private property boundaries, encroachment by housing the overgrown status (alien vegetation) as well as erosion and dumping. Overall, it is not safe and not inviting for public use and access</p>	<ul style="list-style-type: none"> • Institute clean-up to improve accessibility and visibility • Formalise public access points into the open space system as regular intervals (not exceeding 500m) • Pedestrian pathways and infrastructure should be formalised along the length of river system
<p>MAINTENANCE Maintain existing established public parks</p>	<ul style="list-style-type: none"> • Regular maintenance, upkeep and repair programmes must be established and maintained by the CoJ • Encourage buy-in by local communities through creation of employment opportunities and public involvement in the detail design and implementation process
<p>MINING ACTIVITIES Mining activities such as tailing dams and mine dumps have over the years eroded down the river system resulting in deposits of these foreign soils along the banks of the Klipspruit.</p>	<ul style="list-style-type: none"> • Institute clean-up of these areas□□ • Rehabilitate these areas with indigenous vegetation
<p>AGRICULTURAL ACTIVITIES Informal activities such as vegetable cultivation and livestock grazing are currently taking place along the river system throughout the study area</p>	<ul style="list-style-type: none"> • Allow to continue in designated areas along the river system • Make use of local livestock to mow lawn in open space areas • Formalise identified hubs and establish allotments

Source: Silver Horns Consulting. June 2016. Master Plan Framework for the Upper Klipriverine area, Middle Soweto Water Management Unit. Prepared for the City of Johannesburg, City Parks and Johannesburg Zoo.

In July 2012, the CoJ City Parks also commissioned an EIA study for the development of a driving range within Jabavu (Mshengu ville) area in Soweto and appointed Nzumbululo Heritage Solutions. Their study area extended from S26° 14' 23.90", E27°52' 44.68" to S26° 14' 21.0", E27° 52' 18". In their study they reflected on the CoJ's City Parks Green Soweto Vision which seek to transform the dry, dusty and degraded environment and streets of Soweto. They also emphasised the CoJ's aim to transform the township public spaces into vibrant green neighbourhoods, in a way transforms the lives of all community residents and those who visit Soweto. Their study area overlaps with the proposed rehabilitation areas within Jabavu central, Jabulani and Mofolo Central with the site co-ordinates shown below:

Jabavu Central Ext 1	E26 °	14 '	20.085" S
	S27 °	52 '	3.703" E
Jabulani	E 26 °	14 '	21.392"
	S27 °	52 '	27.426"
Mofolo Central	E26 °	14 '	36.118"
	S27 °	52 '	3.888"

The findings from the EIA study has also confirmed some of the findings that are reported with the Specialists studies conducted for the proposed development of parks and rehabilitation activities within the same wetland system. Their findings and recommendations are as follows:

- The wetland feature overall has a very low level of ecological function and service provision. It is unlikely to harbour populations of Red Data Listed flora and fauna species due to its transformed nature as a wetland system.
- The wetland ecological state falls within Class E meaning Seriously Modified.
- The eastern side of the Elias Motsoaledi Road has been more severely transformed than the western part.

The study further recommended that a rehabilitation plan for the wetland be developed for the eastern side and the western side channel be formalised. (Nzumbululo, 2012. Final Environmental Impact Assessment Report For The Proposed Development Of A Driving Range In Jabavu Central (Mshenguville) Soweto, Gauteng Province).

Was a specialist consulted to assist with completing this section

YES X NO

Findings and Recommendations from the Specialist Study was used to complete this section.
Specialist Study report attached as Appendix G4.

If yes complete specialist details

Name of the specialist:

Ms Nonkanyiso Zungu

Qualification(s) of the specialist:

Specialist Ecologist/Wetland Specialist Pr. Nat Sci (Reg. No. 400194/10)

Postal address:

P.O. Box 201, Carlswald, Midrand

Postal code:

1685

Telephone:

011-312 2806

Cell:

084 8000 187

E-mail:

nzungu@sazienviromental.co.za

Fax:

011-312 7208

Are any further specialist studies recommended by the specialist?

YES

NO X

If YES,

specify:

If YES, is such a report(s) attached?

YES

NO

If YES list the specialist reports attached below

Detailed findings and recommendations are provided in the Biodiversity and Wetland Assessment Specialist reports attached as Appendix G3 and G4.

Signature of specialist: _____

Date: _____

Please note; If more than one specialist was consulted to assist with the filling in of this section then this table must be appropriately duplicated

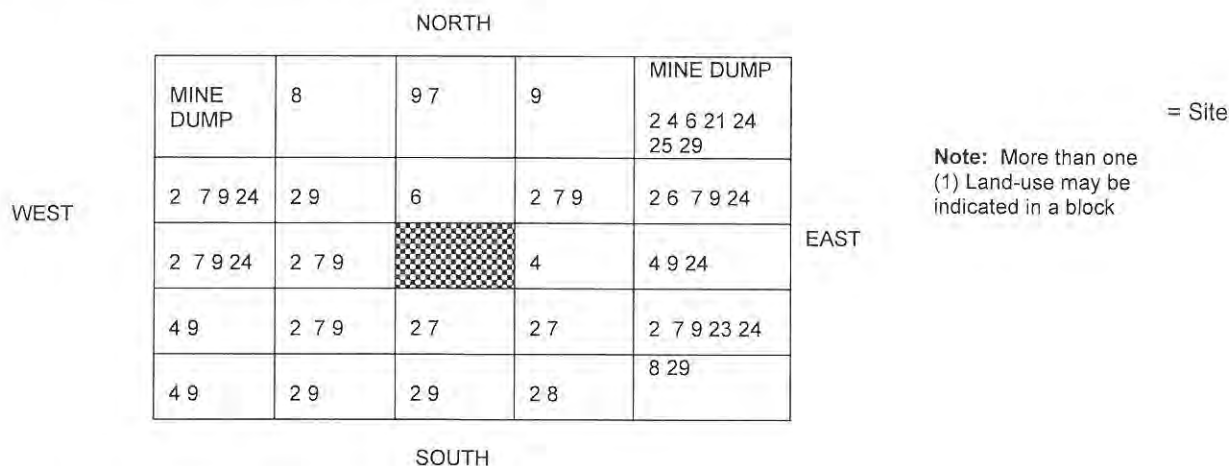
8. LAND USE CHARACTER OF SURROUNDING AREA

Using the associated number of the relevant current land use or prominent feature from the table below, fill in the position of these land-uses in the vacant blocks below which represent a 500m radius around the site

1. Vacant land	2. River, stream, wetland	3. Nature conservation area	4. Public open space	5. Koppie or ridge
6. Dam or reservoir	7. Agriculture	8. Low density residential	9. Medium to high density residential	10. Informal residential
11. Old age home	12. Retail	13. Offices	14. Commercial & warehousing	15. Light industrial
16. Heavy industrial ^{AN}	17. Hospitality facility	18. Church	19. Education facilities	20. Sport facilities

21. Golf course/polo fields	22. Airport ^N	23. Train station or shunting yard ^N	24. Railway line ^N	25. Major road (4 lanes or more) ^N
26. Sewage treatment plant ^A	27. Landfill or waste treatment site ^A	28. Historical building	29. Graveyard	30. Archeological site
31. Open cast mine	32. Underground mine	33. Spoil heap or slimes dam ^A	34. Small Holdings	
Other land uses (describe):	mine dumps; subsistence agriculture, illegal dumping			

NOTE: Each block represents an area of 250m X 250m, if your proposed development is larger than this please use the appropriate number and orientation of hashed blocks



The CoJ Master Plan framework lists the Land use within the study area as follows:

Land use comprises mainly of freestanding residential dwellings (Photo 8.1-1) with limited access to commercial, institutional and industrial. Although for the most part, residential houses form part of an organised street grid, high-density residential and mixed land use is characteristic of Soweto along the Klipspruit River. This land use is largely localised, and includes informal settlement as well, especially in open space areas along the river. Structures are mostly single storey and freestanding, but building density is very high, with little green space.

Overall, the study area appears well serviced in terms of electricity, potable water, sewage and refuse removal. Illegal dumping is widespread, ultimately collecting within the open space system along the river. Informal areas are generally not serviced. (Silver Horns Consulting, 2016). Master Plan Framework for the Upper Klipriverine area, Middle Soweto Water Management Unit. Prepared for the City of Johannesburg, City Parks and Johannesburg Zoo.

The City is in the process of welcoming new Ward Councillors and has also earmarked a few Capex projects over three financial years. The CoJ will collaborate with the implementing agencies for these projects so that there is no duplication of effort. The impact of the multiple projects implemented at the same time within the same area is failure to coordinate existing projects and as such duplicating effort on structures that could be implemented concurrently with other projects happening in the same area.

To mitigation the impact is would be advisable to seek collaboration and working together with other implementing agencies and understand their project timeliness and coordinate efforts such as health and safety team briefings and monitoring obligations. An example of some planned projects that could be aligned with the proposed project.

Id	Unit	Project name	Asset class	Asset sub class	Wards	Region
2839	Environment and infrastructure	Mshenguville wetland rehabilitation. New ecological infrastructure Mfolo North	Water	River	36	D
3455	Housing	Jabulani Hostel New bulk infrastructure	Housing	Hostel/Renewal	46	D
4205	Parks and recreations	CATCH -Implementation of CBP storm water mater planning ; Soweto New storm water management project Orlando west region	Roads and Storm water	Storm water	39	D



3444	Housing	Oldviasta new bulk infrastructure Orlando D regional	Housing	Bulk infrastructure	40	D
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Photo 8.1-1. General land use in Soweto is residential

Please note: The Department may request specialist input/studies depending on the nature of the land use character of the area and potential impact(s) of the proposed activity/ies. Specialist reports that look at health & air quality and noise impacts may be required for any feature above and in particular those features marked with an "A" and with an "N" respectively.

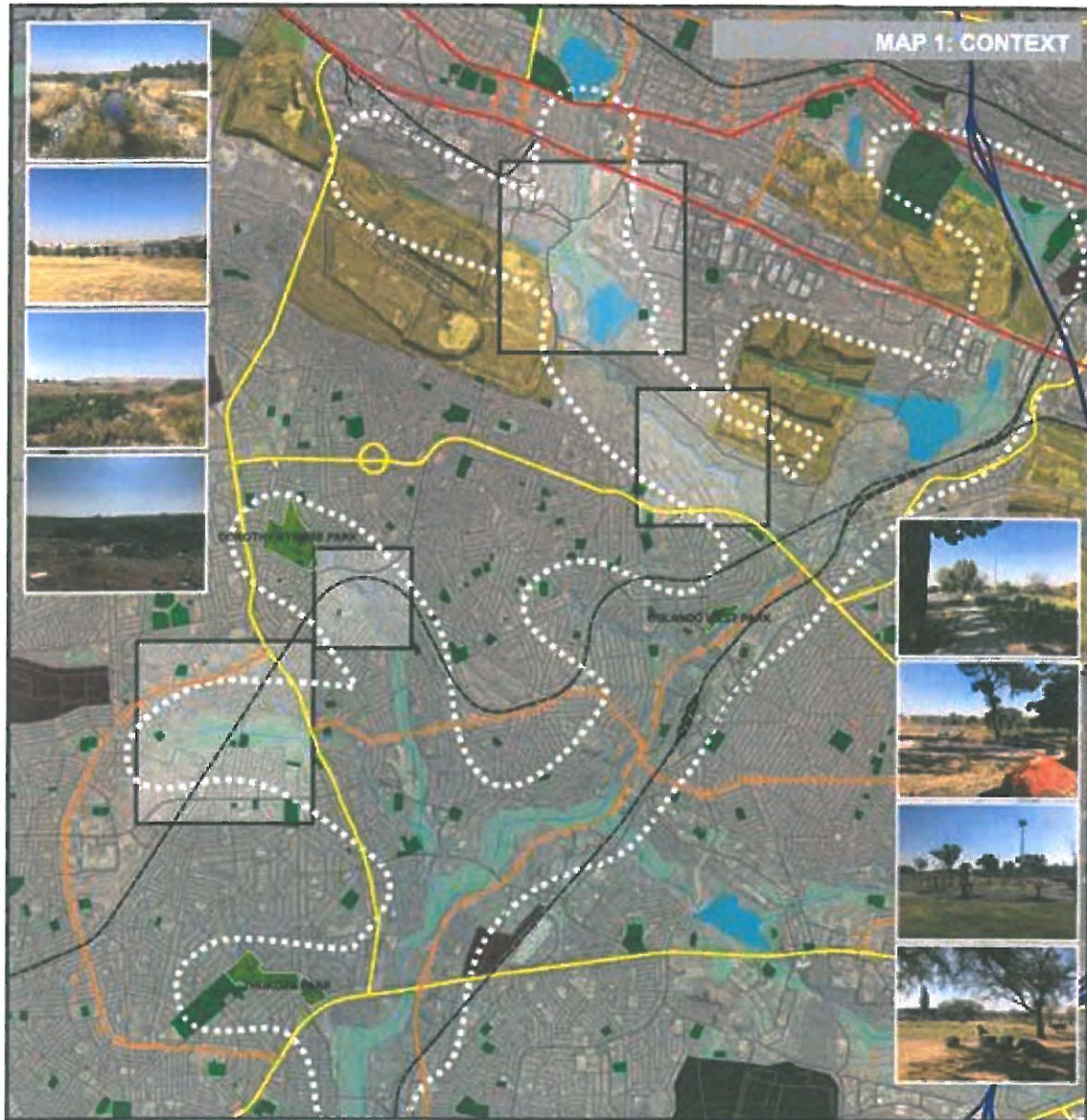
Have specialist reports been attached

Several specialists were engaged to provide a status quo and conduct impact assessment on the critical aspects within the wetland and riverine system. The details of the specialists are provided in Table 1-1, under Section A and their findings are presented as reports and attached as Appendices G.1 - G.5 (see table below).

YES	NO

If yes indicate the type of reports below

1. Hydrological Specialist studies ... Appendix G.1
2. Geohydrology Assessment Report - Appendix G.2
3. Biodiversity Assessment Report - Appendix G.3
4. Wetland Assessment Report - Appendix G.4
5. Heritage Impact Assessment Report - Appendix G.5



LEGEND

<ul style="list-style-type: none"> National freeway National road Secondary road Main road Other roads and streets Railway line Dam Proposed canal Inhabited Municipality Study area Interaction focal area 	<p>LAND USE</p> <ul style="list-style-type: none"> Golf course Commercial Recreational area Sewage works Mining reserves Existing parks
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KLIPSPRUIT, SOWETO
REHABILITATION & DEVELOPMENT MASTER PLAN

Figure 9.1-1 Land Use Map within the study area.

10. 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 m² 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 m² 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?

YES	NO

If YES, explain:

Heritage impact assessment was conducted by PGS Heritage and did not identify any significant heritage resources in the accessible areas as depicted in Figure 10.1-1. The rehabilitation proposed work that might have impact on the heritage resources include the following activities;

- Mulching;
- Erosion control fences;
- Stone gabions and river mattresses;
- Sediment control;
- Treating footpaths; and
- Invasive alien species control.

The finding above are also supported by the outcomes of an EIA Study conducted by Nzumbululo Heritage Solutions in 2012, which concluded that no archaeological or physical cultural sites were recorded on direct path for both the preferred Jabavu driving range site and the alternative site. The lack of clearly distinguishable archaeological sites recorded during their survey conducted at the time is thought to be a result of the level of disturbance, the existing developments around the proposed sites and the wetland nature of the affected project area. (Nzumbululo Heritage Solution, 2011)

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:

10.1 Summary of findings:

There were eight focal areas assessed throughout the study area across all four zones (Figure 10.1-1). Based on the impact assessment process they conducted, they concluded that the impact of the proposed development on the heritage resources is projected as low.

10.2 Recommendations:

Although the impact is projected as low, the specialist did however outline the following mitigation measures to address the impacts:

- Archaeologist to check initial site clearance with construction crew for possible heritage resources.
- Stop construction if any heritage resources - such as graves, human remains or fossils are identifies; and
- Where any significant resources are found the archaeologist must assess and make the appropriate mitigation requirements.

The overall impact of the development on heritage resources is seen as acceptably low and impacts can be mitigated to acceptable levels. The full Heritage Impact Assessment Specialist study report is attached in Appendix. G.5.



Figure 10.1-1– Heritage Impact Assessment focus areas.

Will any building or structure older than 60 years be affected in any way?	YES	NO X
Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?	YES	NO X
If yes, please attached the comments from SAHRA in the appropriate Appendix		

SECTION C: PUBLIC PARTICIPATION (SECTION 41)

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

2. 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):

As part of the legislative requirement of the EIA application process the Public Participation Process must be undertaken to ensure stakeholder engagement and involvement in the process of the proposed development in the area

The key stages of the public participation will involve the following process:

- Compilation of stakeholder database
- Compilation of background information document (BID)
- Internal review of BID by client
- Distribution of BID to key stakeholders, IAPs, Ward Councillor, land owner and adjacent land owners
- Compilation of Public Participation Report

The expected deliverables from the process will include:

- Public Participation Report
- IAP Register
- Stake holder approach

The phase 1 Public participation process has commenced, through this process interested and affected parties were identified and continue to be identified. During this process, we have engaged with relevant authority in this a case, pre consultation meetings with the National Department of Water Affairs and Sanitation (DWS) where we presented the project and its intended outcomes to DWS. Telephonic discussions were also conducted with Gauteng Department of Rural and Development (GDARD) environmental authorization department as a regulating authority to inform the department about the project and its desired outcomes.

A Background Information Document of the project has been compiled to give a brief description of the project to relevant Interested and affected parties.

Due to the study area being WMU, the river and its tributaries flow past various townships of the Soweto township communities. The research process identified approximately 16 wards with in the various townships that border the banks of the stream. This unique situation required mitigation to approach the matter with care, to avoid disseminating information to the wrong people or people who will not be impacted or affected by the proposed project. Furthermore, in mind of the sensitive political environmental in particular that the period falls within the local election campaigning period, it was decided to consult with the implementing agent Johannesburg City Park and Zoos's (JCPZ) liaison unit to use their relationship with the ward councillors for the Soweto regions within the study area to facilitate a meeting to introduce the project and its project management team to the councillors of the affected areas. This meeting will further highlight the requirements of the community and gather information on new stake holders which we may not have identified.

This process has been undertaken in preparation of the phase 2 public participation process.

The public participation Phase 2 process is underway with the CoJ municipality departments taking the lead due to the sensitivity of the local election campaigning period. The purpose of the public participation is to achieve the following;

- Communicate the project objectives and process to the identified IA&P.
- Communicate the process to the community and authority through public participation process

A meeting was held with, Ms Ngamlana joined by Ms Nkele Hoseka and Mr Joe Molefe, both from CRUM in Region A. After detailing what our project was about and explaining that we will need to have community meetings during the Public Participation Process (PPP) as per National Environmental Management Act [No. 107 of 1998] (NEMA) Regulations Section 39 - 44. It was indicated that although they understand the processes that need to be followed, it is not going to be possible for us to hold public meetings because of the upcoming Local Government elections. The main issues are that:

- Some of the Councillors are already aware that they will not continue as councillors after the elections and are not going to co-operate
- Community members are likely to bring up unrelated issues opportunistically as it is quite close to elections and we are therefore unlikely to achieve the desired outcomes
- Things are quite volatile on the ground and they do not want to give community members an opportunity to cause problems at this stage

The meeting then suggested that applications only be done after the elections with new councillors that are expected to be coming in very motivated. It was also suggested that we meet with other employees from within the Regional Director's office who are responsible for projects who will share with us the different projects in the region; including one by the Johannesburg Roads Agency (JRA) for attending to storm water drainage whose PPP took 60 days. This was done in 38 Wards in Soweto. They suggested that we do get the EIA report that was conducted by Nzubululu, which we have discussed in one of our status meetings as well.

When putting this suggestion at the forefront of our current project processes, we reasoned that, at the current planning situation, we could submit the application form on 01 July 2016 and after which we would only commence with public involvement on 15 July 2016, (10 days after submission, when the acceptance letter has been received and making allowance for 4-day preparation to fit within newspaper timeframes etc). The consultation would then be 15 July to 30 August 2016. This is the exact time when the elections are happening (03 August falls within this period).

In the interest of limiting potential objections to the process, due to it being seen as not being procedurally fair, since people would not be paying attention to the process due to elections and the relevant Councillors will not be part of the process. Postponing public involvement (PI), will assist in mitigating against that risk.

The Application has been submitted to the Department and a letter of acknowledgement of receipt was received on the 29 July 2016 (REF Gaut: 002/16-17/E0097).

A follow up meeting held after the completion of the local municipal election took place on the 12th August 2016. The discussions of the meeting is summarised below:

- There is a need to overlay the new ward plan on the surface infrastructure layout plan and develop public involvement approach according to the wards demarcated.
 - Recommended that project meetings be planned with the community liaison officers only after the planned Council meeting is held. The project meetings to be organised will include all the relevant councillors and the meetings will be held at the Jabulani Civic Centre (Region D municipal offices).
 - Proposed that the project meeting can be scheduled for 28 and 29 August 2016. This will be a planning and information sharing meeting with the newly elected Ward Councillors listed in Table C.2-1 to ensure they contribute in the strategic direction of the Public Involvement and are aware of the project developments within their wards.
 - After the meeting with the Councillors and an agreed Public Involvement Plan, the adverts will then go out about the 31 August 2016. And the commenting period will end on 04 October 2016, taking cognisance of the public holiday in September 2016.
 - The draft BAR will be distributed for comments during this period. The report will be availed at these places:
 1. Municipal offices -Jabulani Civic Centre
 2. ??
 3. ???
- A web link will be created as well to facilitate BAR review and be availed to Ward Councillors.
- Public meetings will be scheduled for the week of the 9th or 14th September 2016. Two public meetings at a central location to cater for all the affected wards will be held. The meetings will be arranged according to the project zones. Zone 1 and 2 will be combined and 3 and 4 will be combined. However, it has been recommended that since Zone 4 falls outside of region D and can as such be done separately.
 - The site notices will be erected at the affected areas and as such at each of the zones there will be a site notice. The site notices will also be erected at centres of learning and other strategic places where they can be accessed by the interested and affected public members.
 - The ward councillors will support in arranging for the community meetings for their respective wards.
 - The final BAR will be produced after all the raised issues and comments have been collated during the commenting period. The final report will be submitted to GDRD on 19 October 2016 and it will be given to all the registered stakeholders as well.

Public Participation Process (PPP)

The proposed process highlights the next steps to be taken moving forward with Public Participation Process after the recent local elections and the appointment of new Ward Councillors (Table C.2-1). The proposed PPP timeline or schedule has been developed in line with the Public Participation Proposed Process as detailed in Table C.2-2 and is provided in Table C.3-1.

Table C.2-1 Ward Councillors for Klip Middle Soweto WMU.

Name	Surname	Party	Ward	Contact
Oageng R	Phamodio	ANC	Ward 33	083 483 7196
Shimane B E	Mothamme,	ANC	Ward 34	083 572 7600
Jane	Mzinyane,	ANC	Ward 35	072 023 3248
Nomthandazo I	Mbatha,	ANC	Ward 36	0736482728
Ntombizodwa A	Nxumalo,	ANC	Ward 37	011 984 7793
Matlakala E	Sefolo,	ANC	Ward 38	011 982-4596
Praise-God T	Msibi	ANC	Ward 39	082 856 1860
Phinda	Khumalo	ANC	Ward 40	825323901
Prince	Mbongo	ANC	Ward 41	073 618 0583
Reuben T	Nefotoni	ANC	Ward 42	073 973 0035
Norman	Ngwedzeni	ANC	Ward 43	079 494 7225
Motsile G	Lekgetho	ANC	Ward 44	0839734282
Emmanuel T	Tseleli,	ANC	Ward 45	082 893 2798
Majonny M	Tsobane	ANC	Ward 47	076 515 5065
David S	Dewes	DA	Ward 70	0828932798

Table C.2-2 Public Participation Proposed Process.

PHASE	STATUS
1. Public Participation Process (PPP) <ul style="list-style-type: none"> • Confirm the key stakeholders to include in the process. The stakeholders such as Joburg City Parks and Zoo, Joburg Water JW, Joburg Roads Agency (JRA), businesses and the communities within the WMUs. • Compilation and maintenance of the stakeholder database for the duration of the project as well as the background information document • Introduce the project to the stakeholders, once options and the proposed best practical environmental option (BPOE) have been identified engaged with stakeholders to obtain their inputs in the proposed rehabilitation measures. In this process, we will also find ways of involving the stakeholders in such a way that there is economic empowerment of the local communities. • Communicate with the stakeholders at all key applicable project stages • Take into consideration all inputs and comments made during engagement sessions for input into the reports to be generated • Hold public meetings in the vicinity of the affected areas (WMU) as necessary. 	The process has commenced.
2. Document and record all comments received and responses thereto in a separate Comment and Response Report	Planned.
3. Compile a Public Participation Report	Planned.
4. Submission of Environmental Authorisation Applications to the Gauteng Department of Agriculture and Rural Development (GDARD) for the implementation of rehabilitation measures in accordance with NEMA and EIA Regulations; as necessary	Planned.
5. Manage the project and carry out all these activities taking into consideration the inputs of the different stakeholders	Planned.

The study area (Klip Middle Soweto) falls within the Region D of the City of Johannesburg includes the Wards 33 to 47 and also Ward 70 (Figure C.2-1). The City has several environmental Capex Projects planned and budgeted for within the study area for the next three financial years and are summarised in the table below:

Table C.2-3. List of Planned environmental Capex Project that falls within Region D of the City of Johannesburg for the financial years 2016/17; 2017/18 & 2018/19.

REHABILITATION ZONE	WARD NO.	PLANNED CAPEX PROJECT NAME & ID	IMPLEMENTING UNIT & BUDGET
Zone 1	33	ID 2953 - Pedestrian Bridge in Klipspruit West. New Bridges (Pedestrian and Vehicles) KLIPSPRUIT WEST D Ward	JRA - Roads & Stormwater Budget for Wards 11,15,17,19, 22 & 33: 2016/17 = R7, 000, 000 2017/18 = R5, 000, 000
	34	None	N/A
	35	ID 3253 - Upgrade of Oppenheimer Towers in Central West Jabavu Renewal Park. JABAVU CENTRAL WESTERN D Ward	Jhb City Parks Budget: 2016/17 = R1, 000, 000
Zone 2	36	ID 2839 - Mshenguville wetland rehabilitation New Ecological Infrastructure. MOFOLO NORTH D Ward	Environment & Infrastructure Budget: 2016/17 = R3, 300, 000 2017/18 = R3, 300, 000 2018/19 = R15, 000, 000
	37	None	N/A
Zone 3	38	None	N/A
	39	ID 4205 - CATCH - Implementation of CBP Stormwater Masterplanning: Soweto. New Stormwater Management Projects (ORLANDO WEST) D Regional	JRA - Roads & Stormwater Budget: 2016/17 = R3, 300, 000 2017/18 = R3, 300, 000 2018/19 = R15, 000, 000
	40	None	N/A
	41	None	N/A
	42	None	N/A
	43	None	N/A
	44	None	N/A
	45	None	N/A
Zone 4	43	None	N/A
	44	None	N/A
	70 (outside Region D)	None	N/A

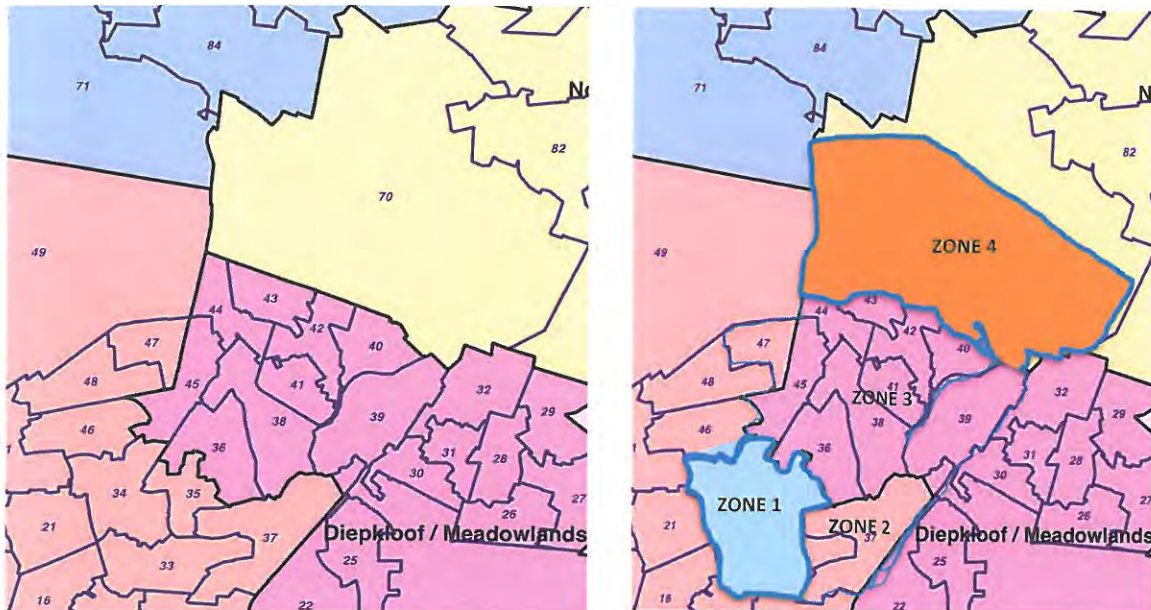


Figure C.2-1. City of Johannesburg Ward boundaries for the study area and the proposed rehabilitation Zones 1-4.

A more detailed on the development of the Project Stakeholder Approach to inform the Public participation and involvement process is outlined in the Table C.2-4 below.
 Table C.2-4 A detailed approach for the Public Involvement and Participation Process.

Activity / Tasks (What was done)	Objectives (Why)	Execution process (How)	Deliverables
1. Stakeholder profiling, data collection and identification of relevant stakeholders and Interested and Affected parties (IAPs).	<ul style="list-style-type: none"> • To ensure that all the relevant stakeholders and Interested and Affected Parties (IAPs) were identified in accordance with the National Environmental Management Act (NEMA), EIA Regulations, 2014; • To understand the socio-economic and geographic environment and key role players within these sectors; • Identification of relevant stakeholders and IAPs. The stakeholder profiling was done to identify all the relevant stakeholders upfront, from various stakeholder sectors including national, provincial and local authorities; civil society sectors and industries. These include the following: <ul style="list-style-type: none"> ➢ Water Affairs (Department of Water and Sanitation); ➢ Environmental Affairs (Department of Environmental Affairs, Gauteng Department of Agriculture and Rural Development (GDARD)); ➢ Parastatal organisations ➢ Community development and social services e.g. local municipal authorities such as the City of Johannesburg Metropolitan, Johannesburg Water; ➢ Civil society sectors e.g. Non-Governmental Organisations (NGO) and Community Based Organisations (CBO) ➢ Industries 	<ul style="list-style-type: none"> • The key stakeholders were notified about the Environmental Studies /Environmental Impact Assessment conducted. The following approach was employed: <ul style="list-style-type: none"> ➢ Understanding of scope of work from the applicant; ➢ Identification of project locality and neighbouring activities and; ➢ Understanding of the site; ➢ Literature review of existing documents and reports including the Municipal Integrated Development Plan (IDP), Environmental Framework Plans, Gauteng Growth Development Strategy, Local Economic Development Plans, Municipal by-laws, and Provincial ordinances; ➢ Literature review of specialists /experts reports that have contributed to the understanding of this water management unit 	<ul style="list-style-type: none"> • Interested and Affected Parties Register (IAPR) • Project locality maps

Activity / Tasks (What was done.)	Objectives (Why)	Execution Plan (How)	Deliverable
		<ul style="list-style-type: none"> • Analysis and review of legislation; • Utilised local setting maps to identify stakeholders such as: <ul style="list-style-type: none"> ➤ Occupiers of land adjacent to the study area; ➤ Current and planned land uses and similar projects that are planned for the study area • National, provincial and local authorities were as sourced from previous experience and knowledge of the government departments who administer laws relating to matters affecting the environmental aspects relevant to the study area, and the application for environmental authorisation included the following: Department of Water and Sanitation(DWS), which was consulted Gauteng Department of Agriculture and Rural Development (GDARD), engaged through telephonic and email communication Johannesburg Roads Agency (JRA) as well as non-profit government organisations, community based organisations, and local businesses and industry. • All organs of the state which have jurisdiction in respect of the activity to which the application relates e.g. Johannesburg Roads Agency, Eskom, Johannesburg Water 	

Activity / Tasks (What was done)	Objectives (Why)	Execution process (How)	Deliverables
<p>1.1. Data verification</p>	<ul style="list-style-type: none"> To validate the preliminary collected data and check credibility to ensure that the relevant Stakeholders and IAPs are contacted, and the correct contact details were recorded. 	<ul style="list-style-type: none"> Validation of collated information was done through literature review of existing documents and reports such as the Municipal IDP Contacting key stakeholders through the community liaison officer and identification of the affected wards. A plan was devised to engage the identified Ward Councilors to preliminarily introduce the project and strategically agree on the method of engaging of the interested and affected communities. 	<ul style="list-style-type: none"> Updated IAP Register Preliminary engagement discussions (detailed in Section C of the BAR)
<p>2. Notification of stakeholders and IAPs.</p> <p>2.1. Compilation of Background Information Document (BID).</p> <p>2.2. Adverts and site notices, notification letter.</p> <p>2.3. Distribution of BID and notifying stakeholders about adverts output date and sourcing and organising meetings.</p>	<ul style="list-style-type: none"> To ensure that Stakeholders and IAPs are informed about the project; Give stakeholders and IAPs an opportunity to liaise any concerns, or suggest solutions they might have in relation to the proposed project; To ensure stakeholders are notified and broader geographic representation of stakeholders is reached. 	<ul style="list-style-type: none"> Confirmation of the local newspaper <ul style="list-style-type: none"> Engaged the ward councillors and the JCPZ community liaison Department and the identified newspapers were Meadowlands News, Orlando News, Jabulani News, which are published by Caxton media. Confirmed with The City of Johannesburg Metropolitan Municipality. Re-checked with newspaper for their geographic distribution boundaries; Sent adverts to newspaper Sent information sharing documents to key stakeholders 	<ul style="list-style-type: none"> BID Copy of advert, on site notice Update of IAP Register.
<p>3. Stakeholder engagement</p> <p>The information collected during stakeholder profiling was used to determine the best engagement strategies. The literacy levels and circumstances that could hinder effective participation was noted during these stages.</p>	<p>The main objectives of the stakeholder engagement are as follows:</p> <ul style="list-style-type: none"> To inform stakeholder authorities about the proposed project; To clarify legislative and administrative requirements; To gather issues and concerns regarding the project and ensure that they are addressed in the Basic Assessment Report; To facilitate, review and inform input into the Basic Assessment Report; To conduct meetings and facilitate presentations of the project to the stakeholders and IAPs, 	<p>The strategy for stakeholder engagement was conducted as follows:</p> <ul style="list-style-type: none"> Pre-consultation meetings were held with key stakeholders such as Department of Water and Sanitation, on 08 April 2016, with the projects Hydrological specialist. Project planning meetings were held with Johannesburg City Parks and Zoo and City of Johannesburg (CoJ) during monthly progress meetings before submission of the application form; Public meetings were held with stakeholders and IAPs; on 14 September 2016. 	<ul style="list-style-type: none"> Notification letters and emails. Submitted written issues and concerns. Presentations held during meetings. Agendas of meetings.

Activity / Tasks (What was done)	Objectives (Why)	Execution Plan (How)	Deliverable
<p>Telephonic engagements to solicit data also done in Zulu/Tswana and Afrikaans when necessary by the dedicated facilitator.</p>	<ul style="list-style-type: none"> • To compile the minutes of the meeting; • To ensure incorporation of issues in the Basic Assessment Report; • To facilitate compilation of Issues and Response Report; 	<p>The meeting organisation entailed telephonic communication to organise meetings, sending emails to confirm the dates and confirmation of meetings and circulation of proposed agenda. Planning meetings were held between the project team, JCPZ and CoJ to coordinate the meetings.</p> <p>The identified ward councillors were preliminary notified about the project via meetings held with the JCPZ liaison department and the CoJ CRUM at the CRUM offices on 31 August 2016. This was followed up with telephonic contact and subsequent emails. The ward councillors and were engaged as well during the distribution of the Basic Assessment Report:</p> <ul style="list-style-type: none"> • Although initial engagement with councillors and the community were strained, due to the local government election that where held on 03 August 2016 during the projects time frame, there were no mobility aspects that could hinder stakeholders from participating. The use local languages to translate the site notices, and ongoing consultation with stakeholder worked effectively in this region Documents was also posted to stakeholder's addresses • Access to information • Libraries were identified as places where the documents for public review could be placed. • Documents were placed at the Johannesburg City Parks and Zoos offices, CoJ offices and Mfolo, Dobsonville, Meadowlands, Orlando, and Jabulani libraries. An internet link was created in the CoJ website where reports were made accessible. 	

Activity / Tasks (What was done)	Objectives (Why)	Execution Plan (How)	Deliverable
<p>4. Collation and consolidating of issues and determining subsequent specialist investigations that would be required.</p>	<ul style="list-style-type: none"> • Consolidate issues raised; • Define terms of reference for specialists. 	<ul style="list-style-type: none"> • Issues raised were collated; • Terms of reference for specialist studies were developed; <p>The specialist studies were undertaken to assess the environment likely to be affected by the proposed project.</p> <p>Impacts were identified through these specialist investigations including use of modelling of collected data, and professional expertise.</p> <p>The identified impacts, were assessed for significance, using the criteria provided in the Basic Assessment Report.</p> <p>The first stage of impact assessment was the identification of environmental activities, aspects and impacts. This was supported by the identification of receptors and resources, which allowed for an understanding of the impact pathway and an assessment of the sensitivity to change.</p> <p>The significance of the impact was assessed by rating each variable numerically according to defined criteria. The purpose of the rating was to develop a clear understanding of influences and processes associated with each impact.</p>	<p>Terms of Reference, Issues and Response Report and Specialist Reports.</p>

3. 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? Not as yet, process underway as described in Section 2 above.

YES	NO
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If "YES", briefly describe the feedback below (also attach copies of any correspondence to and from the stakeholders to this application):

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

Due to the recently completed local municipal elections (3rd August 2016), the newly appointed Councillors (Table C.2-1) will need to be briefed and engaged into the project process as part of the stakeholder consultation and public participation.

A Council meeting is planned soon and immediately after the meeting, an introductory and planning meeting with the Councillors will be organised to inform the councillors about the project, to introduce them to the project and provide them with a progress update so as to involve them in the next step of public involvement. The planning of the next step will be driven by the Councillors and the Community Liaison officers to ensure that the process reaches all the key affected and interested parties within the communities. The awareness, involvement, engagement and support of the community is critical to the success of the project and thus the process to engage them requires the assistance and commitment of the Councillors and Ward-based community structures. A proposed timeline is provided below:

Table C.3-1. : Table Showing Public Participation milestones.

DESCRIPTION	DURATION	PROPOSED START DATE	PROPOSED END DATE
1. Follow up meeting with Client	1 day	12 August 2016	12 August 2016
2. Project Meeting with Councillors: <ul style="list-style-type: none"> • Introduce project to Councillors • Present the progress status of project • Outline the demarcation and proposed activities for each project Zone within each Ward. • Present status Quo of project and requirements for their support 	2 days	28 August 2016	29 August 2016
3. Adverts published to inform I&APs for registration process. Placement of Site Notices at agreed strategic points.	1 day	31 August 2016	31 August 2016
4. Place draft BAR in strategic places for review and comments by registered I&APs. Place the draft BAR at the following venues; (a) Municipal offices -Jabulani Civic Centre (b) ?? (c) ???	30 days	01 September 2016	04 October 2016
5. Organise Public Community Meetings	3 days	02 September 2016	05 September 2016
6. Facilitate a Public Community Meeting for Zone 1 & Zone 2	2 days	06 September 2016/ 13 September 2016	07 September 2016/ 14 September 2016
7. Facilitate a Public Community Meeting in Zone 3	1 day	08 September 2016/ 15 September 2016	08 September 2016/ 15 September 2016
8. Facilitate a Public Community Meeting in Zone 4	1 day	09 September 2016/ 16 September 2016	09 September 2016/ 16 September 2016
9. Collate all comments received and respond to concerns raised to all registered I&APs	3 days	05 October 2016	07 October 2016
10. Facilitate follow up Public Community Meeting and Present draft report with I&APs concerns raised	3 days	10 October 2016	12 October 2016
11. Review Draft BAR	4 Days	13 October 2016	18 October 2016
12. Submission of BAR to GDARD	1 day	19 October 2016	19 October 2016
13. Receipt of environmental authorisation from GDARD	5 days	27 October 2016	27 October 2016

4. 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.

5. 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 times

(complete only when appropriate)

1. WASTE, EFFLUENT, AND EMISSION MANAGEMENT

Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase?

YES	NO
m ³	

If yes, what estimated quantity will be produced per month?

How will the construction solid waste be disposed of (describe)?

quantity not known as yet

Clearing of construction rubble
 Clearing of all illegal waste dumping sites within the study area
 Clearing of alien and invasive plants
 Demolishing of the old delapidated structures (if permission granted)
 Rehabilitation of the river and wetland area (demolish the broken gabions etc)
 The waste material will be collected by an appointed Contractor and regularly dispose of to a licensed waste disposal facility.

Where will the construction solid waste be disposed of (describe)?

Municipality to provide a legal registered waste disposal facility for the materials to be disposed or treated.
 No burning of waste material permitted.

Will the activity produce solid waste during its operational phase?

YES	NO
m ³	

If yes, what estimated quantity will be produced per month?

quantity not known as yet

How will the solid waste be disposed of (describe)?

An appointed and municipal registered contractor will dispose the waste material at the appropriate registered municipal waste disposal facility..

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)?

Municipality to provide a registered waste disposal site and the disposal permit for the materials to be disposed or treated.

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:

During the clearing phase of the rehabilitation, any material removed may still be used in the rehabilitation. For example soil removed from another site will be used to backfill another site or during the development of parks. The boulders removed within the wetland area during rehabilitation might be used within the development of parks as part of beautification and re-vegetation and landscaping of the parks. Solid waste that is recyclable might be reused during the rehabilitation and development of parks, the rest might be used to support the local informal recyclers in the area as part of an educational awareness on waste audits and waste stream recycling.

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
m ³	

The temporal chemical toilets for the site workers will be used during construction and will be removed on completion of the construction period by the relevant contractor.

If yes, what estimated quantity will be produced per month?

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?
If yes, what estimated quantity will be produced per month?

Yes	NO
m ³	

If yes describe the nature of the effluent and how it will be disposed.

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:

Liquid effluent (domestic sewage)

Will the activity produce domestic effluent that will be disposed of in a municipal sewage system?
There will be a construction of ablution facilities within the parks. The design of the public ablution facilities for the parks has not yet been done. They will be connected to the Johannesburg water sewage system. The waste water cannot be estimated at this point in time. (City of Johannesburg Water to issue a letter of confirmation).

YES	NO
m ³	

If yes, what estimated quantity will be produced per month?

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.

Emissions into the atmosphere

Will the activity release emissions into the atmosphere?

Potential dust in the area will be experienced during the clearing of the site and the rehabilitation process. The development of the park operation phase will also release dust in the air due to the ground and soil preparation work. The impact will be short term and of low impact to the health of the community and the workers at the project site. Health and Safety protocols of protective clothing for the workers at the site will be implemented and monitored to ensure compliance.

Dust suppression techniques as part of the EMPr will be applied during clearing, construction, operation and decommissioning phases.

The vehicles and machinery on site for clearing and park development will emit gases into the atmosphere. These will be short term and can be easily mitigated. No authorisation required.

If yes, is it controlled by any legislation of any sphere of government?

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:

YES	NO
YES	NO

2. WATER USE

The City of Johannesburg (Coj) municipality has identified some Water use Activities within their Master plan that have triggered the activities listed under the requirements of Section 21 (c) and (l) water uses in line with the requirements of the National Water Act, 1998 (Act 36 of 1998). More than 30 water use activities were identified from the Master Plan. The following water uses were identified:

- Establishment and/or rehabilitation of parks, The Parks divided into 3 categories which include Regional; Community and Pocket.
 - 2 Regional Parks;
 - 4 Community Parks and
 - 5 Pocket Parks.
- Possible Agricultural Hub.
 - 9 Agricultural Hub
- Rehabilitation of Riverine systems
 - 3 Rehabilitation zones which may trigger several water use activities.

- Upgrading to existing informal soccer field and associated facilities.
- Rehabilitation of Degraded Wetland Area 1
- Rehabilitation of Degraded Wetland Area 2
- General clean-up of refuse and invasive species (several places along the riverine system)
- Development of a New Regional Park which includes activities such as:
 - Event Space; Restaurants and Club House; Canoe launch area and Jetty in Zone 4 (Fleurhof dam)
- New Recreation and Picnic area for Dam Regional Park
- Maintenance at Existing Pocket areas.

The proposed activity of rehabilitation of wetlands and development of parks will form part of the Master plan and some activities may overlap. Several potential links between municipal projects within the study area have been identified (Table C.2-3).

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
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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: liters

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
-----	----

The proposed project is situated within a Water management unit and within boundaries of a dam and wetland and usually requires a WUL. CoJ is a state department and thus may be exempted from the application of the WUL. However, a formal letter stating the exemption will be requested (if such be the case) and will be attached as Appendix.....

If yes, list the permits required

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

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

Battery operated lighting for security lighting at construction camp
Solar-powered lighting for security lighting at construction camp
Petrol/Diesel powered machinery
These can be potential alternative energy sources to be considered.

4. ENERGY EFFICIENCY

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

Most work will be done during daylight for maximum lighting
Energy saving bulbs used for lighting for security lighting at construction camp
Solar power or battery power for machinery/tools
Use of manual/hand tools and tools instead of mechanical or energy powered tools.

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

Battery operated lighting for security lighting at construction camp
Solar-powered lighting for security lighting at construction camp
Petrol/Diesel powered machinery
These can be potential alternative energy sources to be considered.

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.

Public Participation Phase 2 has not yet commenced with the recent local municipal election period completed. The recent follow up meeting held with the municipality on the 12th August 2016 has proposed a strategic process that has been outlined in detail in Section C.2 and Section C.3 above. The newly appointed Ward Councillors will assist in leading the process for community engagement (Table C.2-1). Please see Section C above for more details (Table C.2-2 and Table C.3-1).

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):

Still to be completed once information is received from the proposed process outlined in Section C above (Table C.2-2) including the proposed timelines in Table C.3-1.

2. IMPACTS THAT MAY RESULT FROM THE CONSTRUCTION AND OPERATIONAL PHASE

Briefly describe the methodology utilised in the rating of significance.

2.1 METHODOLOGY FOR ASSESSING HERITAGE SITE SIGNIFICANCE

The section below outlines the assessment methodologies utilised in the study. The assessment of possible impacts during the rehabilitation stage was done through the establishment of a standardised and internationally recognised methodology to assess the significance of the potential environmental impacts of the proposed rehabilitation activities. The significance of the impacts was determined through the following:

For each impact, the SEVERITY (size or degree) (DURATION (time scale) and EXTENT (spatial scale) as outlined in Table E.2.1-1, are used to determine the CONSEQUENCE of the impact as outlined in Table E.2.1-2.

Table E.2.1-1: Ranking criteria for environmental impacts

SEVERITY/INTENSITY	H	Substantial deterioration (death, illness or injury). Recommended level will often be violated. Irreplaceable loss of resources.
	M	Moderate/ measurable deterioration (discomfort). Recommended level will occasionally be violated. Noticeable loss of resources.
	L	Minor deterioration (nuisance or minor deterioration). Change not measurable/ will remain in the current range. Recommended level will never be violated. Limited loss of resources.
DURATION	L	Quickly reversible. Less than the project life. Short term (0-5 years)
	M	Reversible over time. Life of the project. Medium term (6-15 years)
	H	Permanent. Beyond closure. Long term (>15 years)
SPATIAL SCALE	L	Localised - Within the site boundary.
	M	Fairly widespread – Beyond the site boundary. Local
	H	Widespread – Far beyond site boundary. Regional/ national

Table E.2.1-2: Determining the consequence

SEVERITY	DURATION		SPATIAL SCALE		
			Site Specific (L)	Local (M)	Regional/ National (H)
Low	Long term	H	Medium	Medium	Medium
	Medium term	M	Low	Low	Medium
	Short term	L	Low	Low	Medium
Medium	Long term	H	Medium	Medium	Medium
	Medium term	M	Medium	Medium	Medium
	Short term	L	Low	Medium	Medium
High	Long term	H	Medium	Medium	Medium
	Medium term	M	Medium	Medium	Medium
	Short term	L	Medium	Medium	Medium

The SIGNIFICANCE of an impact is then determined by multiplying the consequence of the impact by the probability of the impact occurring, as shown Table E.2.1-3, with interpretation of the impact significance outlined in Table E.2.1-4.

Table E.2.1-3: Determining the Significance Rating

PROBABILITY (of exposure to impacts)		CONSEQUENCE		
		L	M	H
Definite/ Continuous	H	Medium	Medium	High
Possible/ frequent	M	Medium	Medium	High
Unlikely/ seldom	L	Low	Low	Medium

Table E.2.1-4: The interpretation of the impact significance

SIGNIFICANCE	CRITERIA
High	It would influence the decision regardless of any possible mitigation.
Medium	It should have an influence on the decision unless it is mitigated.
Low	It will not have an influence on the decision.

Table E.2.1-5: The interpretation of the status of the impact

IMPACT STATUS	CRITERIA
Positive	The impact benefits the environment
Negative	The impact results in a cost to the environment
Neutral	The impact has no effect on the environment

Once the significance of an impact has been determined, the CONFIDENCE in the assessment of the significance rating is ascertained using the rating systems outlined in **Table E.2.1-6**.

Table E.2.1-6: Definition of confidence ratings

CONFIDENCE RATINGS*	CRITERIA
High	Wealth of information on and sound understanding of the environmental factors potentially influencing the impact. Greater than 70% sure of impact prediction.
Medium	Reasonable amount of useful information on and relatively sound understanding of the environmental factors potentially influencing the impact. Between 35 and 70% sure of impact prediction.
Low	Limited useful information on and understanding of the environmental factors potentially influencing this impact. Less than 35% sure of impact prediction.

* The level of confidence in the prediction is based on specialist knowledge of that particular field and the reliability of data used to make the prediction. The degree to which the impact can be reversed is estimated using the rating system shown in **Table E.2.1-7**.

Table E.2.1-7: Definition of Reversibility Ratings

REVERSIBILITY RATINGS	CRITERIA
Irreversible	Where the impact is permanent.
Partially Reversible	Where the impact can be partially reversed.
Fully Reversible	Where the impact can be completely reversed.

The degree to which there will be a loss of resources, as shown in **Table E.2.1-8** refers to the degree to which a resource is permanently affected by the activity, i.e. the degree to which a resource is irreplaceable.

Table E.2.1-8: Definition of loss of resources	
LOSS OF RESOURCES	CRITERIA
Low	Where the activity results in a loss of a particular resource but where the natural, cultural and social functions and processes are not affected.
Medium	Where the loss of a resource occurs, but natural, cultural and social functions and processes continue, albeit in a modified way.
High	Where the activity results in an irreplaceable loss of a resource.

Lastly, the degree to which the impact can be mitigated or enhanced is shown in **Table E.2.1-9**.

Table E.2.1-9: Degree to which impact can be mitigated

DEGREE TO WHICH IMPACT CAN BE MITIGATED	CRITERIA
None	No change in impact after mitigation.
Very Low	Where the significance rating stays the same, but where mitigation will reduce the intensity of the impact.
Low	Where the significance rating drops by one level, after mitigation.
Medium	Where the significance rating drops by two to three levels, after mitigation.
High	Where the significance rating drops by more than three levels, after mitigation.

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.

The significance rating of the identified impacts are provided in Table E.2.1-1.

Proposal

The study area is divided into **four (4) Rehabilitation Zones; Zone 1, Zone 2, Zone 3 and Zone 4** as depicted in Figure 2.1-1 and each Zone will be treated differently as the intervention requirements are not the same for all the sites within each Zone.

A. Planning & Design impacts (site assessment)

The following impacts are applicable to all identified Zones (Zones 1-4)

Site Assessment and Preparation:

The following activities are applicable to all zones:

- Demarcate areas and zones for construction phase and operation rehabilitation activities.
- Consultations with relevant authorities on site requirements
- Site clearing
 - Demarcation of construction camp and rehabilitation areas
 - Implement construction operations guidelines and EMPr for the Phase
- Recruitment of local site workers
- Training of site workers;
- Safety and site management, environmental induction, wetland and rehabilitation,
- Source PPE safety equipment
- Consultation with a qualified botanist on the type of plants suitable for different types of soils for each site within the identified zones.

B. Construction Phase impacts (construction of camp)

The following impacts are applicable to all identified Zones (Zones 1-4)

- Site clearance for camp construction
- Remove vegetation
- Prepare soil for construction
- Delivery of material, equipment and tools required
- Delivery of machinery for construction
- Materials gathering
- Temporal storage of materials to be used during operational phase (Mulch; seed, seedlings, topsoil, Wire etc)
- Mulch harvesting & Seed collection (Mulch harvesting; seed harvesting, seedlings nursery establishment)

- Soil Stockpiling
- Gabion structures construction material (rocks, mesh wire, tools for tying gabions etc)
- Topsoil for re-vegetation (seed planting and back fill of holes or bare areas)
- Soil erosion structures construction
- Earth berms
- Deliver and place ablation facilities on site

C. Operational Phase Impacts (actual rehabilitation activities)

The following impacts are Zone Specific:

Zone 1 - (Thokoza Park, Jabavu, Moroka Dam):

- Installation of erosion control fences
- Stone Gabions construction and installation (**gabion baskets, box gabions and gabion mattresses**)
- Installation of River mattress
- Sediment control using silt fence
- Sediment control using gravel bags
- Treating footpaths using organic mulch
- Preventing overgrazing of wetland vegetation and animal footpaths (rotational grazing)
- Invasive alien species control
- Bank stabilisation using Soil bioengineering techniques (establishing a dense cover of soil protecting plants)
- Addressing illegal dumping through river clean ups (clearing of debris in water, clearing of blocked culverts and more)
- Address dumping of yard waste into the seasonal zone of a wetland
- Preventing unsustainable reed harvesting
- Soil and ground movement during rehabilitation activities in stream areas.
- Clearing of silt on the river banks and inlet to wetland
- Installation of fencing and gates for access control
- Erosion Control
- Storm Water and Flood Management
- Construction of Berms Storm water Structures
- Address deterioration of water quality
- Disposal of domestic solid waste and building rubbles

Zone 2 - (Orlando West Park section to Kliptown):

- **Mulching of slopes and banks (Stabilisation of slopes using geotextile; seeding slopes to get them ready for mulching; Harvesting of trees for mulching, Layering slopes with mulch)**
- Installation of erosion control fences
- Stone Gabions construction and installation (**gabion baskets, box gabions and gabion mattresses**)
- Installation of River mattress
- Sediment control using silt fence
- Sediment control using gravel bags
- Treating footpaths using organic mulch
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- Installation of fencing and gates for access control
- Erosion Control
- Storm Water and Flood Management
- Construction of Berms Storm water Structures
- Address deterioration of water quality
- Disposal of domestic solid waste and building rubbles

Zone 3 - (Dorothy Nyembe Park):

- Installation of erosion control fences
- Stone Gabions construction and installation (**gabion mattresses**)
- Installation of River mattress
- Sediment control using gravel bags
- Treating footpaths using organic mulch
- Invasive alien species control
- Bank stabilisation using Soil bioengineering techniques (establishing a dense cover of soil protecting plants)
- Addressing illegal dumping through river clean ups (clearing of debris in water, clearing of blocked culverts and more)

- Addressing dumping of yard waste into the seasonal zone of a wetland
- Preventing unsustainable reed harvesting
- Soil and ground movement during rehabilitation activities in stream areas.
- Clearing of silt on the river banks and inlet to wetland
- Installation of fencing and gates for access control
- Erosion Control
- Storm Water and Flood Management
- Construction of Berms Storm water Structures
- Address deterioration of water quality
- Disposal of domestic solid waste and building rubbles

Zone 4 - (Fleurhof Dam):

- **Development of a New Regional Park and walkways**
- **Construction of additional recreational facilities for the Fleurhof Dam such as** Event Space; Restaurants and Club House; Retail Space and Canoe launch area and Jetty.
- Installation of erosion control fences
- Stone Gabions construction and installation (gabion baskets, box gabions and gabion mattresses)
- Installation of River mattress
- Sediment control using silt fence
- Sediment control using gravel bags
- Treating footpaths using organic mulch
- Preventing overgrazing of wetland vegetation and animal footpaths (rotational grazing)
- Invasive alien species control
- Bank stabilisation using Soil bioengineering techniques (establishing a dense cover of soil protecting plants)
- Addressing illegal dumping through river clean ups (clearing of debris in water, clearing of blocked culverts and more)
- Address dumping of yard waste into the seasonal zone of a wetland
- Preventing unsustainable reed harvesting
- Soil and ground movement during rehabilitation activities in stream areas.
- Clearing of silt on the river banks and inlet to wetland
- Installation of fencing and gates for access control
- Erosion Control
- Storm Water and Flood Management
- Construction of Berms Storm water Structures
- Address deterioration of water quality
- Disposal of domestic solid waste and building rubbles
- Determine status of water use for the construction of residential developments within Fleurhof and apply for water use licence (if required).

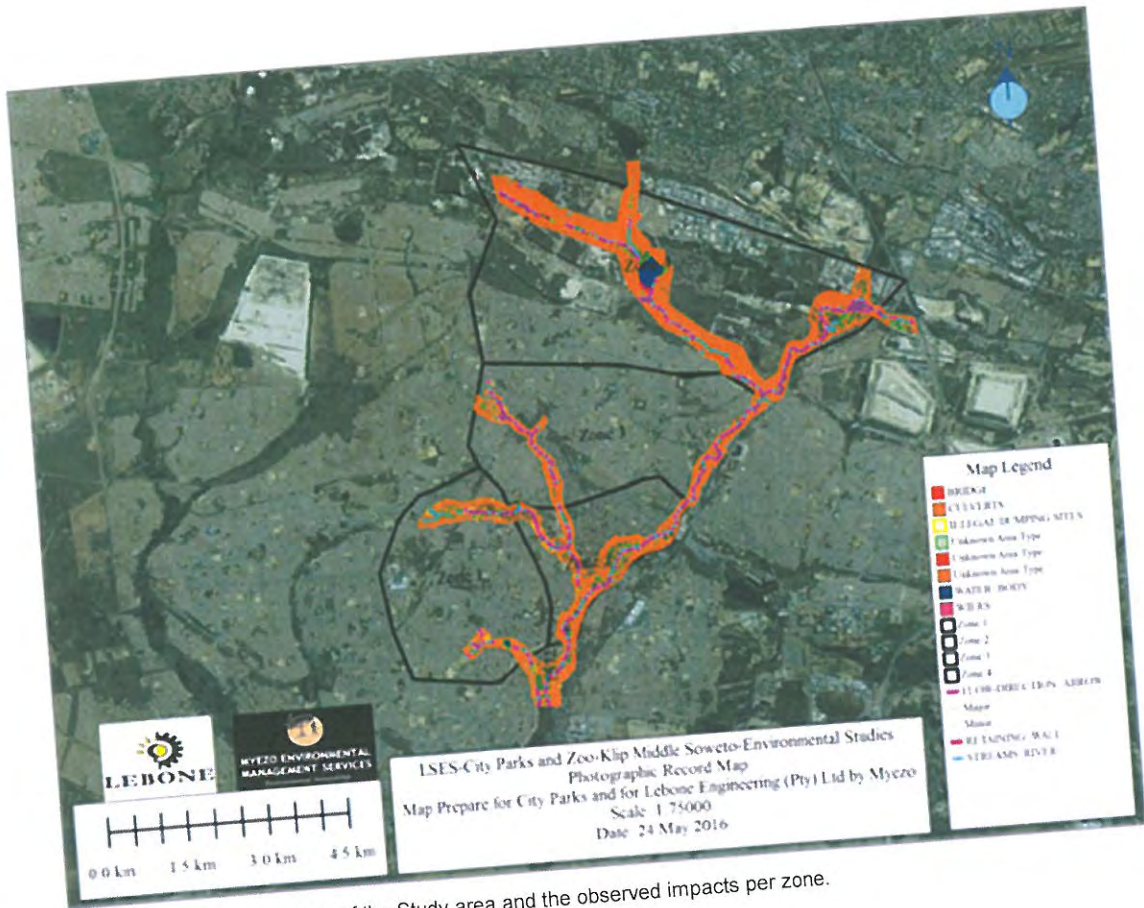


Figure E.2.1-1 The four zones of the Study area and the observed impacts per zone.

A detailed summary of the calculated significant rating for identified impacts and their mitigation interventions are given in Section E Table 2.1-1.

Table E.2.1-1: Impact Assessment and Risk Rating (Rehabilitation of the Klip Middle Soweto WMU)

Activities	Impacts	Aspects affected	Phase	Significance rating	Typical mitigation measures
A. DESIGN & PLANNING PHASE					
Site Assessment <ul style="list-style-type: none"> • Delineate areas and zones for construction phase and operation rehabilitation activities. • Consultations with relevant authorities on site requirements 	Land to be cleared of vegetation Change of land use of identified site(s)	Land users Loss of animal habitat	Design and Planning	Low	Careful consideration to reduce the footprint of the rehabilitation programme not to increase impact to the environment. Construction camp can be located on a previously disturbed areas (if possible) and should be located outside the 1:100 yr floodline of the watercourse. Low noise machinery to be sourced.
Site Preparation <ul style="list-style-type: none"> • Recruitment of local site workers • Training of site workers; • Safety and site management, environmental induction, wetland and rehabilitation. • Source PPE safety equipment • Consultation with a qualified botanist on the type of plants suitable for different types of soils for each site within the identified zones. 	Job creation Skills development Personnel safety Natural vegetation maintained and re-generated through seedlings and transplanting	Employees and the community from which the workforce is sourced.	Design and Planning	Low	Local community personnel to be sourced/recruited for rehabilitation. Local site workers to undergo extensive safety and environmental induction training on requirements including wetland rehabilitation requirements including worker behaviour on site. Site Specific vegetation, seeds and mulch to be sourced and stored correctly before use
B. CONSTRUCTION PHASE					
Construction camp <ul style="list-style-type: none"> • Clear the site for construction 	Damage to top soil; Compaction of soil;	Surrounding community Streams affected by sewage pollution.	Construction	Medium	Bare surfaces must be managed as small as possible. All personnel to use the construction environmental management programme

<ul style="list-style-type: none"> Erosion management. 	<p>Soil health for indigenous vegetation growth River banks eroded</p> <p>Soil pollution - waste illegal dumping</p>				<p>are to be stabilised to prevent erosion.</p> <p>All construction vehicles and machinery and equipment must be properly maintained to prevent leaks</p>
<p>Waste management</p>	<p>An increase in the amount of litter being generated</p> <p>Non-use of sanitation facilities</p>	<p>Soil polluted</p> <p>Water sources polluted</p>	<p>Construction</p>	<p>Medium</p>	<p>Environmental Awareness induction training must be conducted to address the general site and sanitation facilities management.</p> <p>Site management procedures and guidelines must be implemented and all waste and rubble must be collected in appropriate waste receptacles and disposed of at the nearest authorised landfill site.</p>
<p>Plant and seed material harvesting</p> <ul style="list-style-type: none"> Harvest seeds and seedlings to be used for re-vegetation Harvest mulch from trees to be used for mulching process Set up plant and seed nursery at construction camp for all species to be used for re-vegetation 	<p>Seed harvesting</p> <p>Mulch harvesting</p> <p>Nursery Set up</p> <p>Loss of vegetation and species of conservation value.</p>	<p>Loss of animal habitat</p>	<p>Construction</p>	<p>Low</p>	<p>Ensure minimum amounts of seeds are harvested without presenting further impacts to the environment</p> <p>Ensure careful harvesting of trees for mulch; when harvesting for mulch, every third or fourth tree or large shrub will be cut at 30 mm above ground so as not to change the habitat too drastically;</p>
<p>Clearing of silt on the river banks and inlet to wetland</p>	<p>Impact posed by Damage to bank due to sediment transport.</p>	<p>Ripping/loosening of soil</p> <p>Material Stockpile</p> <p>Grading/leveling of the landscape</p>	<p>Construction</p>	<p>Medium</p>	<p>Bare surfaces must be managed as small as possible.</p> <p>The side slopes of topsoil must be less than 1:3 (v:h).</p> <p>The landscape must blend with the surrounding areas to avoid water ponding.</p>
<p>C. OPERATION PHASE</p>					
<p>C.1 Wetland rehabilitation</p>					

Erosion Control	<p>Altering of banks. Impeding the flow. Changing the watercourse. Siltation & sedimentation</p>	Construction of berms Storm water structures revegetation of bare areas	Operation	Medium	Activities within 500m measured from the center of the stream are deemed water uses in line with Section 21(c) of the NWA. Berms and storm water channels must be considered during the construction phase in order to divert clean runoff from the external catchment away from the disturbed areas.															
Storm Water and Flood Management	<p>Houses located within the 1:100 years flood lines pose a risk. Reduction in design capacity of the culvert due to silted up culvert crossings</p>	<p>Location of infrastructure in the flood lines Maintenance of hydraulic structures Infilling of excavation</p>	Operation	Medium	<p>A maintenance schedule for clearing silt at the culvert crossing must be designed and implemented. Flood protection structures like attenuation walls must be designed and constructed for residential dwellings located within the flood risk areas.</p>															
Address deterioration of water quality	<ul style="list-style-type: none"> Clear blocked Sewer lines and Waste Water treatment plants. Address Illegal Waste Disposal Address Residential Development Activities 	<p>Users of water Animals and plants using water as habitat</p>	Operation	Medium	<p>Ensure Proper water resource protection measures Enforce Section 19 of NWA which places a duty on everyone to avoid pollution and degradation of water resources. Conduct public awareness educating people about importance and function of water resources i.e. wetland Ensure Proper Waste Management Measures.</p>															
Disposal of domestic waste and building rubbles	<ul style="list-style-type: none"> Waste Sorting Waste Transportation Waste Disposal 	<p>Soil health Human health</p>	Operation	Medium	<p>Implement Waste collection and sorting from the source. Ensure Proper Waste Management Measures. Public Awareness regarding importance and function of water resource</p>															
Removal of alien invasive species	<p>Soil roughness Exposure of soil, increased erosion levels due to run-off of water. Little precipitation and evaporation, loss of habitat life, reduced water table levels</p>	<p>Soil and indigenous species that depend on alien vegetation</p>	Operation	<table border="1"> <thead> <tr> <th></th> <th>Without mitigation</th> <th>With mitigation</th> </tr> </thead> <tbody> <tr> <td>Severity</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Duration</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Extent</td> <td>Local</td> <td>Local</td> </tr> <tr> <td>Consequence</td> <td>Medium</td> <td>Low</td> </tr> </tbody> </table>		Without mitigation	With mitigation	Severity	Low	Low	Duration	Low	Low	Extent	Local	Local	Consequence	Medium	Low	<p>Re-vegetation of indigenous species will be implemented as a mitigation measure</p>
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				<p>Alteration of the river bank and impeding water flow, Changing the watercourse. Siltation & sedimentation. Vegetation removal, Altering the river bank and impeding structures.</p>	<p>Operation</p>	<p>Operation</p>
<p>Probability</p>	<p>Medium</p>	<p>Low</p>	<p>Low</p>	<p>With mitigation</p>	<p>With mitigation</p>	<p>Re-vegetation of indigenous species will be implemented as a mitigation measure</p>
<p>Significance</p>	<p>Low</p>	<p>Low</p>	<p>Low</p>	<p>Low</p>	<p>Low</p>	
<p>Status</p>	<p>Negative</p>	<p>Negative</p>	<p>Negative</p>	<p>Low</p>	<p>Low</p>	
<p>Confidence</p>	<p>High</p>	<p>High</p>	<p>High</p>	<p>Local</p>	<p>Local</p>	
<p>Reversibility</p>	<p>Low</p>	<p>Low</p>	<p>Low</p>	<p>Medium</p>	<p>Medium</p>	
<p>Loss of resource</p>	<p>Low</p>	<p>Low</p>	<p>Low</p>	<p>Low</p>	<p>Low</p>	
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<p>Consequence</p>	<p>Medium</p>	<p>Medium</p>	<p>Medium</p>	<p>Low</p>	<p>Low</p>	
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<p>Severity</p>	<p>Without mitigation</p>	<p>Without mitigation</p>	<p>Without mitigation</p>	<p>Without mitigation</p>	<p>Without mitigation</p>	<p>Use of organic mulches only (based on wood products); mulch from trees is to be applied when dry so as to eliminate chemical impact on soil; cutting down of</p>
<p>Duration</p>	<p>Low</p>	<p>Low</p>	<p>Low</p>	<p>Short term</p>	<p>Short term</p>	
<p>Extent</p>	<p>Localised</p>	<p>Localised</p>	<p>Localised</p>	<p>Localised</p>	<p>Localised</p>	

Installation of erosion control fences	<p>Impact posed by damage to bank and slopes through excavation of topsoil for installation of metal stakes for fence (iron standard fence and wire netting) by digging holes on ground or slope; trampling.</p> <p>Top soil will be susceptible to erosion; run-off of soil during rain events that may cause sedimentation, poor water quality, riparian vegetation disturbed</p>	Streams that will be silted and users of water who depend on non-polluted water.	Operational	<table border="1"> <tr> <td>Consequence</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Probability</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Significance</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Status</td> <td>Positive</td> <td>Positive</td> </tr> <tr> <td>Confidence</td> <td>High</td> <td>High</td> </tr> <tr> <td>Reversibility</td> <td>Fully reversible</td> <td>Fully reversible</td> </tr> <tr> <td>Loss of resource</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Degree to which the impact can be mitigated</td> <td>High</td> <td>High</td> </tr> <tr> <td>Nature of cumulative impact</td> <td colspan="2">Not expected to result in cumulative impacts</td> </tr> </table>	Consequence	Low	Low	Probability	Low	Low	Significance	Low	Low	Status	Positive	Positive	Confidence	High	High	Reversibility	Fully reversible	Fully reversible	Loss of resource	Low	Low	Degree to which the impact can be mitigated	High	High	Nature of cumulative impact	Not expected to result in cumulative impacts																																																	
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trees (especially indigenous trees) is temporary loss as the trees will resprout with time. Monitoring of alien invasion or weed encroachment after mulching process.	<table border="1"> <tr> <td>Consequence</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Probability</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Significance</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Status</td> <td>Positive</td> <td>Positive</td> </tr> <tr> <td>Confidence</td> <td>High</td> <td>High</td> </tr> <tr> <td>Reversibility</td> <td>Fully reversible</td> <td>Fully reversible</td> </tr> <tr> <td>Loss of resource</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Degree to which the impact can be mitigated</td> <td>High</td> <td>High</td> </tr> <tr> <td>Nature of cumulative impact</td> <td colspan="2">Not expected to result in cumulative impacts</td> </tr> </table>	Consequence	Low	Low	Probability	Low	Low	Significance	Low	Low	Status	Positive	Positive	Confidence	High	High	Reversibility	Fully reversible	Fully reversible	Loss of resource	Low	Low	Degree to which the impact can be mitigated	High	High	Nature of cumulative impact	Not expected to result in cumulative impacts		Fences will be used with mulch for effective water control and microclimate creation; when placing mulched fences, the work will be done around existing vegetation; trampled sections will quickly regrow.	<table border="1"> <tr> <td>Consequence</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Probability</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Significance</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Status</td> <td>Negative</td> <td>Negative</td> </tr> <tr> <td>Confidence</td> <td>High</td> <td>High</td> </tr> <tr> <td>Reversibility</td> <td>Fully reversible</td> <td>Fully reversible</td> </tr> <tr> <td>Loss of resource</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Degree to which the impact can be mitigated</td> <td>High</td> <td>High</td> </tr> </table>	Consequence	Low	Low	Probability	Low	Low	Significance	Low	Low	Status	Negative	Negative	Confidence	High	High	Reversibility	Fully reversible	Fully reversible	Loss of resource	Low	Low	Degree to which the impact can be mitigated	High	High	<table border="1"> <tr> <td>Consequence</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Probability</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Significance</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Status</td> <td>Negative</td> <td>Negative</td> </tr> <tr> <td>Confidence</td> <td>High</td> <td>High</td> </tr> <tr> <td>Reversibility</td> <td>Fully reversible</td> <td>Fully reversible</td> </tr> <tr> <td>Loss of resource</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Degree to which the impact can be mitigated</td> <td>High</td> <td>High</td> </tr> </table>	Consequence	Low	Low	Probability	Low	Low	Significance	Low	Low	Status	Negative	Negative	Confidence	High	High	Reversibility	Fully reversible	Fully reversible	Loss of resource	Low	Low	Degree to which the impact can be mitigated	High	High
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<p>Stone Gabions construction and installation</p> <ul style="list-style-type: none"> Dredging for installation of gabions; trampling; excavation of soil and vegetation, impeding of water flow 	<p>Riparian zone banks and vegetation; flow regime; sedimentation; water quality, habitat loss for invertebrates and microscopic organisms living under rocks</p>	<p>Users of water</p>	<p>Operation</p>	<table border="1"> <tr> <td></td> <td>Without mitigation</td> <td>With mitigation</td> </tr> <tr> <td>Severity</td> <td>Moderate</td> <td>Low</td> </tr> <tr> <td>Duration</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Extent</td> <td>Localised</td> <td>Localised</td> </tr> <tr> <td>Consequence</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Probability</td> <td>Medium</td> <td>Medium</td> </tr> <tr> <td>Significance</td> <td>Medium</td> <td>Medium</td> </tr> <tr> <td>Status</td> <td>Negative</td> <td>Negative</td> </tr> <tr> <td>Confidence</td> <td>Medium</td> <td>Medium</td> </tr> <tr> <td>Reversibility</td> <td>Fully reversible</td> <td>Fully reversible</td> </tr> <tr> <td>Loss of resource</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Degree to which the impact can be mitigated</td> <td>High</td> <td>High</td> </tr> </table>		Without mitigation	With mitigation	Severity	Moderate	Low	Duration	Low	Low	Extent	Localised	Localised	Consequence	Low	Low	Probability	Medium	Medium	Significance	Medium	Medium	Status	Negative	Negative	Confidence	Medium	Medium	Reversibility	Fully reversible	Fully reversible	Loss of resource	Low	Low	Degree to which the impact can be mitigated	High	High	<p>Gabions preferably used with geotextiles to reduce water velocities and to recapture river bed sediment; during construction of gabion structures, the correct height, shape and foundation will be relevant to site being rehabilitated; qualified engineers will be consulted on appropriate gabion structures and installations; microscopic organisms and invertebrates will obtain new habitat under rocks within habitat; once gabions are installed properly, vegetation will regrow and sedimentation and erosion will cease</p>
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<p>Installation of River mattress</p> <ul style="list-style-type: none"> Dredging for installation of gabions; trampling; excavation of soil and vegetation. 	<p>Riparian zone banks and vegetation; flow regime; sedimentation; water quality.</p>	<p>Users of water.</p>	<p>Operation</p>	<table border="1"> <tr> <td></td> <td>Without mitigation</td> <td>With mitigation</td> </tr> <tr> <td>Severity</td> <td>Medium</td> <td>Low</td> </tr> <tr> <td>Duration</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Extent</td> <td>Localised</td> <td>Localised</td> </tr> <tr> <td>Consequence</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Probability</td> <td>Medium</td> <td>Medium</td> </tr> <tr> <td>Significance</td> <td>Medium</td> <td>Medium</td> </tr> <tr> <td>Status</td> <td>Negative</td> <td>Negative</td> </tr> <tr> <td>Confidence</td> <td>Medium</td> <td>Medium</td> </tr> <tr> <td>Reversibility</td> <td>Fully reversible</td> <td>Fully reversible</td> </tr> <tr> <td>Loss of resource</td> <td>Low</td> <td>Low</td> </tr> </table>		Without mitigation	With mitigation	Severity	Medium	Low	Duration	Low	Low	Extent	Localised	Localised	Consequence	Low	Low	Probability	Medium	Medium	Significance	Medium	Medium	Status	Negative	Negative	Confidence	Medium	Medium	Reversibility	Fully reversible	Fully reversible	Loss of resource	Low	Low	<p>River Mattresses preferably used with geotextiles to reduce water velocities and to recapture river bed sediment; during construction of river mattress structures, the correct height, shape and foundation will be relevant to site being rehabilitated; qualified engineers will be consulted on appropriate river mattress structures and installations, once river mattresses are installed properly, vegetation will regrow</p>			
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Sediment control using silt fence	Impact posed by damage to bank and slopes through excavation of topsoil for installation of wood stakes for fence by digging holes on ground or slope; trampling. Top soil will be susceptible to erosion; run-off of soil during rain events that may cause sedimentation, poor water quality, riparian vegetation disturbed, flow regime disturbed; trenching	Those who depend on the streams	Operation	Degree to which the impact can be mitigated	High	High	and sedimentation and erosion will cease
				Severity	Without mitigation	With mitigation	When installing the fence tree roots are present then installation needs to be done around the roots so that they are not cut down; slope gradient will be considered; soil type must also be considered; inspection and monitoring required after installation
				Duration	Low	Low	
				Extent	Short term	Short term	
				Consequence	Localised	Localised	
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				Degree to which the impact can be mitigated	High	High	

Sediment control using gravel bags	Clogging of gravel bags resulting in poor water quality, gravel changing flow, bursting of gravel bags, bags water regime,	Water quality, flow regime, aquatic fauna and flora habitat disturbance	Operation	The gravel bags need to be inspected prior to forecast rain, during extended rain events, after rain events and weekly during the rainy season. If the gravel bags are exposed to sunlight for a prolonged period, they will need to be replaced every three months due to the degradation of the bags by the sun; the bags will need to be replaced, sediment accumulate in the bags must be removed periodically in order to maintain the effectiveness of the bags. Inspection and maintenance must be reshaped and as needed, that will be carried out throughout the lifespan of the process.	<table border="1"> <tr> <td></td> <td>Without mitigation</td> <td>With mitigation</td> </tr> <tr> <td>Severity</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Duration</td> <td>Short term</td> <td>Short term</td> </tr> <tr> <td>Extent</td> <td>Medium</td> <td>Low</td> </tr> <tr> <td>Consequence</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Probability</td> <td>Medium</td> <td>Low</td> </tr> <tr> <td>Significance</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Status</td> <td>Negative</td> <td>Positive</td> </tr> <tr> <td>Confidence</td> <td>Medium</td> <td>Medium</td> </tr> <tr> <td>Reversibility</td> <td>Fully reversible</td> <td>Fully reversible</td> </tr> <tr> <td>Loss of resource</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Degree to which the impact can be mitigated</td> <td>High</td> <td>High</td> </tr> </table>		Without mitigation	With mitigation	Severity	Low	Low	Duration	Short term	Short term	Extent	Medium	Low	Consequence	Low	Low	Probability	Medium	Low	Significance	Low	Low	Status	Negative	Positive	Confidence	Medium	Medium	Reversibility	Fully reversible	Fully reversible	Loss of resource	Low	Low	Degree to which the impact can be mitigated	High	High	<table border="1"> <tr> <td></td> <td>Without mitigation</td> <td>With mitigation</td> </tr> <tr> <td>Severity</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Duration</td> <td>Short term</td> <td>Short term</td> </tr> <tr> <td>Extent</td> <td>Local</td> <td>Local</td> </tr> <tr> <td>Consequence</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Probability</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Significance</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Status</td> <td>Negative</td> <td>Positive</td> </tr> <tr> <td>Confidence</td> <td>Medium</td> <td>Medium</td> </tr> </table>		Without mitigation	With mitigation	Severity	Low	Low	Duration	Short term	Short term	Extent	Local	Local	Consequence	Low	Low	Probability	Low	Low	Significance	Low	Low	Status	Negative	Positive	Confidence	Medium	Medium
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Treating footpaths using organic mulch	Disturbance of flow regime (water flow along path to be rehabilitated must be stopped); Trampling vegetation and habitat; water pollution	Water quality and flow; riparian and surrounding vegetation; Stream users	Operation	This method of rehabilitation is only suitable for flat surfaces and moderate slopes; rooted plants on the paths to be rehabilitated should not be removed; path-forming animals must be removed or reduced; area being treated should also be demarcated so that people do not	<table border="1"> <tr> <td></td> <td>Without mitigation</td> <td>With mitigation</td> </tr> <tr> <td>Severity</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Duration</td> <td>Short term</td> <td>Short term</td> </tr> <tr> <td>Extent</td> <td>Local</td> <td>Local</td> </tr> <tr> <td>Consequence</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Probability</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Significance</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Status</td> <td>Negative</td> <td>Positive</td> </tr> <tr> <td>Confidence</td> <td>Medium</td> <td>Medium</td> </tr> </table>		Without mitigation	With mitigation	Severity	Low	Low	Duration	Short term	Short term	Extent	Local	Local	Consequence	Low	Low	Probability	Low	Low	Significance	Low	Low	Status	Negative	Positive	Confidence	Medium	Medium	<table border="1"> <tr> <td></td> <td>Without mitigation</td> <td>With mitigation</td> </tr> <tr> <td>Severity</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Duration</td> <td>Short term</td> <td>Short term</td> </tr> <tr> <td>Extent</td> <td>Local</td> <td>Local</td> </tr> <tr> <td>Consequence</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Probability</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Significance</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Status</td> <td>Negative</td> <td>Positive</td> </tr> <tr> <td>Confidence</td> <td>Medium</td> <td>Medium</td> </tr> </table>		Without mitigation	With mitigation	Severity	Low	Low	Duration	Short term	Short term	Extent	Local	Local	Consequence	Low	Low	Probability	Low	Low	Significance	Low	Low	Status	Negative	Positive	Confidence	Medium	Medium									
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<p>disturbance: death of non-target species</p>				<table border="1"> <tr> <td>Status</td> <td>Negative</td> <td>Negative</td> </tr> <tr> <td>Confidence</td> <td>Medium</td> <td>Medium</td> </tr> <tr> <td>Reversibility</td> <td>Fully reversible</td> <td>Fully reversible</td> </tr> <tr> <td>Loss of resource</td> <td>Medium</td> <td>Low</td> </tr> <tr> <td>Degree to which the impact can be mitigated</td> <td>Medium</td> <td>Medium</td> </tr> </table> <p>set); herbicides must not be applied during the wet seas (before or after rain) as they will wash away into rivers and watercourses and contaminate them; manual removal using mechanised tools is effective in removal of dense stands of aliens; manual removal of alien invasive species is only</p>	Status	Negative	Negative	Confidence	Medium	Medium	Reversibility	Fully reversible	Fully reversible	Loss of resource	Medium	Low	Degree to which the impact can be mitigated	Medium	Medium																					
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<p>Bank stabilisation using Soil bioengineering techniques (establishing a dense cover on soil protecting plants)</p> <ul style="list-style-type: none"> • Digging on banks and surrounding landscape when preparing soil for planting; trampling; 	<p>River banks</p>	<p>Soil; riparian and surrounding vegetation</p>	<p>Operational</p>	<table border="1"> <tr> <td></td> <td>Without mitigation</td> <td>With mitigation</td> </tr> <tr> <td>Severity</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Duration</td> <td>Short term</td> <td>Short term</td> </tr> <tr> <td>Extent</td> <td>Localised</td> <td>Localised</td> </tr> <tr> <td>Consequence</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Probability</td> <td>Medium</td> <td>Medium</td> </tr> <tr> <td>Significance</td> <td>Medium</td> <td>Medium</td> </tr> <tr> <td>Status</td> <td>Negative</td> <td>Negative</td> </tr> <tr> <td>Confidence</td> <td>Medium</td> <td>Medium</td> </tr> <tr> <td>Reversibility</td> <td>Fully reversible</td> <td>Fully reversible</td> </tr> <tr> <td>Loss of resource</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Degree to which the impact can be mitigated</td> <td>High</td> <td>High</td> </tr> </table> <p>Transplanting of small seedlings from an area where they are abundant is advisable as small seedlings are likely to transplant more successfully than large ones; plants with vigorous rooting growth are preferential and must be used as they accelerate natural plant succession; all planting will need to be followed by some form of micro-habitat treatment such as mulching with local plant material or using surface geotextile or moisture capturing hollows. It is also advisable to plant when the wet season has begun in order to eliminate the need for watering plants; monitoring is vital to ensure that the a thick layer of vegetation is successfully created</p>		Without mitigation	With mitigation	Severity	Low	Low	Duration	Short term	Short term	Extent	Localised	Localised	Consequence	Low	Low	Probability	Medium	Medium	Significance	Medium	Medium	Status	Negative	Negative	Confidence	Medium	Medium	Reversibility	Fully reversible	Fully reversible	Loss of resource	Low	Low	Degree to which the impact can be mitigated	High	High
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<p>Addressing illegal dumping through river clean ups (clearing of debris in water, clearing of blocked culverts and more)</p>	<p>Trampling; temporary disturbance of fauna during the process</p>	<p>Soil, invertebrates, vertebrates and mammals</p>	<p>Operation & Decommission</p>	<p>with minimal environmental impact; a qualified botanist must be consulted on the type of plants suitable for different types of soils etc.</p>																																																												
<p>Preventing unsustainable reed harvesting the purpose of rehabilitating a wetland for conservation purposes</p>	<p>Wetland will be able to perform important functions such as flood attenuation, sediment control, water purification, provision of habitat for fauna and avifauna</p>	<p>Soil; water quality; fauna; water flow</p>	<p>Operation</p>	<p>Harvesting seasons need to be implemented and enforced, harvesting should only be allowed at certain times during certain conditions, reasonable yields should also be set; fines should be set for illegal harvesting.</p>																																																												
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C.2 Heritage Resources						
Soil and ground movement during rehabilitation activities in stream areas.			Heritage	Construction & Operational		Archaeologist to check initial site clearance with construction crew for possible heritage resources. Where any significant resources are found the archaeologist must assess and make the appropriate mitigation requirements. Stop construction if any heritage resources – such as graves, human remains or fossils are identified.
Disturbance of unidentified heritage resources – chance finds Destruction of undiscovered subsurface heritage resources during construction activities. The severity if the impact on heritage resources found during construction will be medium and will be in most cases be localised. The probability of such chance finds occurring is low. After mitigation the severity of impact will be minimal with the implementation of mitigation measures.						
C.3 Development of Parks						
Installation of fencing and gates	Damage to top soil; Siltation; Compaction of soil / rutting	Excavation Casting of foundations for poles Delivery of material	Operation	Low		Material required for fencing must be stored at a clearly demarcated area like the contractor camp. This camp must be located close to the area earmarked for infrastructure like ablation facilities in order to centralise the impacted area.



Erosion Control	<p>Altering of banks. Impeding the flow. Changing the watercourse. Siltation & sedimentation</p>	Construction of berms		Operation	Medium	<p>Activities within 500m measured from the center of the stream are deemed water uses in line with Section 21(c) of the NWA. Berms and stormwater channels must be considered during the construction phase in order to divert clean runoff from the external catchment away from the disturbed areas.</p>
		Stormwater structures	Revegetation of bare areas			
Storm Water and Flood Management	<p>Houses located within the 1:100 years flood lines pose a risk. Reduction in design capacity of the culvert due to silted up culvert crossings</p>	Location of infrastructure in the flood lines		Operation & Decommissioning	Medium	<p>A maintenance schedule for clearing silt at the culvert crossing must be designed and implemented. Flood protection structures like attenuation walls must be designed and constructed for residential dwellings located within the flood risk areas.</p>
		Maintenance of hydraulic structures	Infilling of excavation			
Deterioration of water quality	<p>Acid Mine Drainage from defunct Mines. Raw sewage flowing to the streams. Storm Water Pollution due to illegal domestic waste disposal sites. Use of machinery during construction Dust generation.</p>	Mine related water quality impacts		Construction	Medium	<p>Proper water resource protection measures like "Polluter Pays Principles" must be enforced.</p>
		Blocked Sewer lines and Waste Water treatment plants.				
		Illegal Waste Disposal				
		Residential Development Activities				
Disposal of domestic waste and building rubbles	<p>Water Quality deterioration due to disposal of waste at water resources.</p>	Waste Sorting		Construction	Medium	<p>Ensure Waste collection and sorting from the source. Proper Waste Management Measures.</p>

Table 2.1-2. Impact Assessment and Risk Rating (Rehabilitation of the Klip Middle Soweto)
Decommissioning Phase


D. DECOMMISSIONING PHASE					
Site Closure	Soil disturbance and exposure from demolition works	Soil	Decommissioning	Medium	Implement proper site closure procedures and guidelines as per the approved EMPR
Demolish construction camp on site without impact to environment	Visual impact - Dust generation due to demolition works	Air quality			
Remove any soil or plant material stockpiles	Loss of soil and vegetation	Soil and biodiversity			
Demolish the temporal plant and seedlings nursery	Soil pollution and groundwater pollution	Surface water quality			
Site clean up must be undertaken	Water quality impacts of demolition works near water features	Ground water quality			
	Construction noise - Demolition activity will generate noise from				






<p>Remove all waste material types and dispose properly and at registered landfill site.</p> <p>All equipment and machinery must be properly removed from site</p> <p>Remove all sanitation facilities from site</p> <p>Ensure the closed site does not present any safety risk to human or environment</p> <p>Ensure proper project handover to relevant community authorities for monitoring and maintenance</p>	<p>vehicles, machinery, equipment and personnel</p> <p>Loss of income to temporary employed community members</p>	<p>Loss of employment and source of income</p>		<p>Engage municipality Parks and Environment Departments responsible for maintenance of wetlands and parks in the area to provide opportunities to the trained community members. The team members might be used in the monitoring of the rehabilitated areas and future wetland rehabilitation programmes to be implemented by the municipality.</p>
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Table E.3.1-1: Representation of site specific rehabilitation activities within each identified and assessed wetland Zone.


PRE- REHABILITATION ACTIVITIES	REHABILITATION INTERVENTION	SIZE AND SCALE OF DISTURBANCE	WETLAND ZONE AND SITE CO-ORDINATES	FIGURE AND MAP NO. (for easy reference)	IMPACTS	ASPECT AFFECTED	PHASE	MITIGATION MEASURES
Site Assessment and Preparation - Site clearing - Demarcation of construction camp and rehabilitation areas	Implement construction operations guidelines and EMPr	Area of all sites to be rehabilitated (.....m ² /ha)	All Zones Zone 1 - 4		Damage to top soil; Compaction of soil; Soil loss due to excavation for poles to fence off construction camp	Land to be cleared of vegetation Change of land use of identified site(s)	Design & Planning	Careful consideration to reduce the footprint of the rehabilitation programme not to increase impact to the environment. Construction camp can be located on a previously disturbed areas (if possible) and should be located outside the 1:100 yr flood line of the watercourse. Low noise machinery to be sourced. Local community personnel to be sourced/recruited for rehabilitation. Local site workers to undergo extensive safety and environmental induction training on environmental and wetland rehabilitation requirements including worker behaviour on site.
Construction of site camp: - Delivery and temporal storage of Material - Delivery and temporal storage of Machinery and Equipment	Implement construction operations guidelines and EMPr	Area earmarked for construction camp	All Zones Zone 1 - 4		Soil pollution due to oil leaks from machinery Loss of vegetation	Job creation Skills development Personnel safety Natural vegetation maintained and re-generated	Construction Phase	Bare surfaces must be managed as small as possible. All personnel to use the construction environmental management programme guidelines to reduce



REHABILITATION ACTIVITIES	REHABILITATION INTERVENTION	SIZE AND SCALE OF DISTURBANCE	WETLAND ZONE AND SITE CO-ORDINATES	FIGURE AND MAP NO. (for easy reference)	IMPACTS	ASPECT AFFECTED	PHASE	MITIGATION MEASURES
					<p>Dust generation Noise from machinery, equipment and personnel Use of machinery during construction Ablution facilities installation</p>	<p>through seedlings and transplanting</p>		<p>machinery and personnel noise levels to low. Soil erosion and soil pollution to be minimised by implementing the Construction site environmental management programme and guidelines. Dust suppression measures to be implemented. Site for construction to be placed where alien invasive plant species are demarcated for removal as part of the rehabilitation intervention. Sanitation facilities must not be located within 50m of any water resources or water drainage areas. Facilities must be regularly checked and serviced regularly to reduce risk of soil pollution, surface water and groundwater pollution. Site Specific vegetation, seeds and mulch to be sourced and stored correctly before use</p>






<p>Mulching of slopes and banks (Stabilisation of slopes using geotextile; seeding slopes to get them ready for mulching; Harvesting of trees for mulching. Layering slopes with mulch)</p>	<p>Use of organic mulches only (based on wood products).</p>	<p>100 m²-200 m²</p>	<p>Zone 2 - Orlando West Park Section of WMU -26,22816S ; 27,92191E</p> <p>Zone 2 Klipspruit Valley road to Chris Hani Road -26,151064S; 27,534582E</p>		<p>Trampling, damage to topsoil, tree felling, nutrient overload, weed contamination</p>	<p>Water quality, soil integrity, riparian vegetation</p>	<p>Operation</p>	<ul style="list-style-type: none"> - Careful harvesting of mulch material - Apply mulch from trees when dry to eliminate chemical impact on soil - when harvesting for mulch, every third or fourth tree or large shrub will be cut at 30 mm above ground so as not to change the habitat too drastically; - cutting down of trees (especially indigenous trees) is temporary loss as the trees will resprout with time. - Monitoring of alien invasion or weed encroachment after mulching process
<p>Installation of erosion control fences</p>	<p>Fences will be used with mulch for effective water control and microclimate creation</p>	<p>100 m²</p>	<p>Zone 2: CVB Wetland Orlando West Township to Kliptown (South Soweto) 26°13'52.32"S; 27°05'38.17"E</p> <p>Zone 1 Thokoza Park Section of WMU -26, 263267S; 27,880685E</p> <p>Zone 1</p>		<p>Impact posed by damage to bank and slopes through excavation of topsoil for - Installation of metal stakes for fence (iron standard fence and wire netting) by digging holes on ground or slope; trampling</p>	<p>Top soil will be susceptible to erosion; run-off of soil during rain events that may cause sedimentation, poor water quality, riparian vegetation disturbed</p>	<p>Operation</p>	<ul style="list-style-type: none"> - when placing mulched fences, the work will be done around existing vegetation; - trampled sections will quickly regrow

<p>Stone Gabions construction and installation (gabion baskets, box gabions and gabion mattresses)</p>	<p>Gabions preferably used with geotextiles to reduce water velocities and to recapture river bed sediment;</p>	<p>100 m²-200 m²</p>	<p>Zone 1 Jabavu Section -26,238839S; 27,871249 E)</p>		<p>Dredging for installation of gabions; trampling; excavation of soil and vegetation, impeding of water flow</p>	<p>Riparian zone banks and vegetation; flow regime; sedimentation; water quality; habitat loss for invertebrates and microscopic organisms living under rocks</p>	<p>Construction and Operation</p>	<p>- during construction of gabion structures, the correct height, shape and foundation will be relevant to site being rehabilitated; - qualified engineers will be consulted on appropriate gabion structures and installations; - microscopic organisms and invertebrates will obtain new habitat under rocks within habitat; - once gabions are installed properly, vegetation will regrow and sedimentation and erosion will cease.</p>
<p>Zone 1 Thokoza Park Section of WMU -26, 263267S and 27,880685E</p>	<p>Zone 1: Thokoza Park Section of WMU -26, 263267S and 27,880685E</p>	<p>Zone 1</p>	<p>Zone 1: Thokoza Park Section of WMU -26, 263267S and 27,880685E</p>		<p>Dredging for installation of gabions; trampling; excavation of soil and vegetation, impeding of water flow</p>	<p>Riparian zone banks and vegetation; flow regime; sedimentation; water quality; habitat loss for invertebrates and microscopic organisms living under rocks</p>	<p>Construction and Operation</p>	<p>- during construction of gabion structures, the correct height, shape and foundation will be relevant to site being rehabilitated; - qualified engineers will be consulted on appropriate gabion structures and installations; - microscopic organisms and invertebrates will obtain new habitat under rocks within habitat; - once gabions are installed properly, vegetation will regrow and sedimentation and erosion will cease.</p>
<p>Zone 2: Various sections on the Klipspruit Valley road to Chris Hani road -26,151064S; 27,534582E</p>	<p>Zone 2: Various sections on the Klipspruit Valley road to Chris Hani road -26,151064S; 27,534582E</p>	<p>Zone 2: Various sections on the Klipspruit Valley road to Chris Hani road -26,151064S; 27,534582E</p>	<p>Zone 2: Various sections on the Klipspruit Valley road to Chris Hani road -26,151064S; 27,534582E</p>	 <p>Collapsed gabion</p>  <p>Collapsed gabion mattress and gabion deposit</p>	<p>Dredging for installation of gabions; trampling; excavation of soil and vegetation, impeding of water flow</p>	<p>Riparian zone banks and vegetation; flow regime; sedimentation; water quality; habitat loss for invertebrates and microscopic organisms living under rocks</p>	<p>Construction and Operation</p>	<p>- during construction of gabion structures, the correct height, shape and foundation will be relevant to site being rehabilitated; - qualified engineers will be consulted on appropriate gabion structures and installations; - microscopic organisms and invertebrates will obtain new habitat under rocks within habitat; - once gabions are installed properly, vegetation will regrow and sedimentation and erosion will cease.</p>
<p>Zone 1: Jabavu Section -26,239247S; 27,87292E</p>	<p>Zone 1: Jabavu Section -26,239247S; 27,87292E</p>	<p>Zone 1: Jabavu Section -26,239247S; 27,87292E</p>	<p>Zone 1: Jabavu Section -26,239247S; 27,87292E</p>	 <p>(gabion baskets)</p>	<p>Dredging for installation of gabions; trampling; excavation of soil and vegetation, impeding of water flow</p>	<p>Riparian zone banks and vegetation; flow regime; sedimentation; water quality; habitat loss for invertebrates and microscopic organisms living under rocks</p>	<p>Construction and Operation</p>	<p>- during construction of gabion structures, the correct height, shape and foundation will be relevant to site being rehabilitated; - qualified engineers will be consulted on appropriate gabion structures and installations; - microscopic organisms and invertebrates will obtain new habitat under rocks within habitat; - once gabions are installed properly, vegetation will regrow and sedimentation and erosion will cease.</p>


Installation of River mattress	River Mattresses preferably used with geotextiles to reduce water velocities and to recapture river bed sediment.	100 m ² -200 m ²	<p>Zone 3: Dorothy Nyembe Park -26.222794 S; 27.876948E</p> <p>Zone 2: CVB wetland Orlando West Township to Kiptown (South Soweto) 26°13'52.32"S and 27°55'38.17"E</p> <p>Zone 1 of CVB wetland Zone 1</p> <p>Zone 2: Mofolo Park Section of the WMU -26.241491 S; 27.89025E</p>	  <p>(Box gabions and gabion baskets to stabilise river banks)</p>  <p>(Gabion mattresses)</p>   	Dredging for installation of gabions; trampling; excavation of soil and vegetation.	Riparian zone banks and vegetation; flow regime; sedimentation; water quality.	Construction and Operational	<ul style="list-style-type: none"> - during construction of river mattress structures, the correct height, shape and foundation will be relevant to site being rehabilitated; - qualified engineers will be consulted on appropriate river mattress structures and installations; - once river mattresses are installed properly, vegetation will regrow and sedimentation and erosion will cease
Sediment control using silt fence	Installing the silt fence with consideration on the slope gradient and soil type.	100 m ² -200 m ²			Impact posed by damage to bank and slopes through excavation of topsoil for Installation of	Top soil will be susceptible to erosion; run-off of soil during rain events that may cause sedimentation, poor water quality.	Operational	When installing the fence tree roots are present then installation needs to be done around the roots so that they are not cut down;




Sediment control using gravel bags	Use of gravel bags	100 m ² -200 m ²	<p>Zone 1 of CVB wetland</p> <p>Zone 1: Moroka Dam</p> <p>Zone 2: Klipspruit Valley road to Chris Hani road -26.256519S; 27.891401E</p> <p>Zone 2: Mofolo Park 26.241491S; 27.89025E</p> <p>Zone 1 of CVB wetland</p> <p>Zone 3: Dorothy Nyembe Park</p> <p>Zone 2: Klipspruit valley Road to Chris Hani section of VMU</p>		<p>wood stakes for fence by digging holes on ground or slope; trampling</p> <p>Alteration of the river bank and impeding water flow, Changing the watercourse. Siltation & sedimentation. Vegetation removal. Altering the river bank and impeding structures</p> <p>Clogging of gravel bags resulting in poor water quality, gravel changing flow direction of gravel bags water regime,</p>	<p>riparian vegetation disturbed, flow regime disturbed; trenching</p> <p>River bank, riparian zones, vegetation loss</p> <p>Water quality, flow regime, aquatic fauna and flora habitat disturbance</p>		<p>- slope gradient will be considered;</p> <p>- soil type must also be considered;</p> <p>- inspection and monitoring required after installation</p>
						Operational	<p>- Re-vegetation of indigenous species will be implemented as a mitigation measure</p> <p>-The gravel bags need to be inspected prior to forecast rain, during extended rain events, after rain events and weekly during the rainy season.</p> <p>- If the gravel bags are exposed to sunlight for a prolonged period, they will need to be replaced every three months due to the degradation of the bags by the sun;</p> <p>- the bags will need to be reshaped and replaced as needed;</p> <p>- sediment that will accumulate in the bags must be removed periodically in order to maintain</p>	


<p>Treating footpaths using organic mulch</p>			<p>-26, 256519S; 27,891401E</p>		<p>Disturbance of flow regime (water flow along path to be rehabilitated must be stopped); trampling vegetation and habitat; water pollution</p>	<p>Water quality and flow, riparian and surrounding vegetation</p>	<p>Operational</p>	<p>the effectiveness of the bags. - Inspection and maintenance must be carried out throughout the lifespan of the process. - Retain rooted plants on the paths to be rehabilitated; - Remove or reduce path-forming animals; - Clear demarcation of area being treated so that people do not continuously trample on it.</p>
<p>Preventing overgrazing of wetland vegetation and animal footpaths (rotational grazing)</p>	<p>Rehabilitate only in flat surfaces and moderate slopes,</p>	<p>100 m²</p>	<p>Zone 1 of CVB wetland</p>		<p>Reduced grazing time; more time for vegetation to grow and recover, less waterlogged soils</p>	<p>Vegetation, soil, water quality</p>	<p>Operational and Decommissioning</p>	<p>- determine grazing capacity for the wetland - monitor rotational grazing to ensure that the wetland capacity for grazing is not exceeded - ensure maintenance of animal trampling is kept at low levels by monitoring grazing times as animals will not be grazing on the wetlands all the time. - This also ensures that when soils are waterlogged, they cannot be worsened by trampling as animals will only graze when conditions are favourable</p>



<p>Invasive alien species control</p>	<p>Removal of invasive alien species using different control methods. Only herbicides registered for use on a specific species must be used;</p>	<p>400 m²</p>	<p>Zone 2: Mofolo Park -26.241491S; 27,89029E</p> <p>Zone 1: Jabavu area of the MWU -26.239247S ; 27,87292E</p> <p>Zone 1 of CVB Wetland Rockville area (includes Moroka Dam and Thokoza Park)</p> <p>Zone 2 of CVB wetland</p>	    	<p>Soil roughness Exposure of soil, increased erosion levels due to run-off of water. Little precipitation and evaporation, loss of habitat life, reduced water table levels</p> <p>Soil disturbance; soil and water contamination from petrol or oil (if using mechanised method and herbicides); death of aquatic life due to water contamination ; riparian zone disturbance; death of non-target species</p>	<p>Soil and indigenous species that depend on alien vegetation</p> <p>Water quality; soil; aquatic fauna and flora; human and animals health can be affected due to herbicides;</p>	<p>Construction</p>	<p>- manual removal using mechanised tools is effective in removal of dense stands of aliens; - manual removal of alien invasive species is only effective in areas with low infestations;</p>
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		Operational	<ul style="list-style-type: none"> - Herbicides must only be sprayed during active growing of plants; - plants need to be sprayed before the seeds are produced (namely between flowering and fruit set); - herbicides must not be applied during the wet seas (before or after rain) as they will wash away into rivers and watercourses and contaminate them; - biocontrol agents that may threaten commercial populations of target species that exist nearby - Re-vegetation of indigenous

<p>Bank stabilisation using Soil bioengineering techniques (establishing a dense cover of soil protecting plants)</p>	<p>- Transplant small seedlings from an area where they are abundant - choose plants with vigorous rooting growth are preferential and must be used as they accelerate natural plant succession;</p>	<p>300 m²</p>	<p>Zone 2: CVB wetland Orlando West Township to Kiptown (South Soweto) 26°13'52.32"S and 27°55'38.17"E Zone 2 of CVB</p>		<p>Digging on banks and surrounding landscape when preparing soil for planting; trampling;</p>	<p>Soil, riparian and surrounding vegetation</p>	<p>Construction</p>	<p>species will be implemented as a mitigation measure.</p>
<p>- Careful and proper methods for transplanting of small seedlings to be used. - select plants with vigorous rooting growth are preferential and must be used as they accelerate natural plant succession; - ensure that all planting will be followed by some form of micro-habitat treatment such as mulching with local plant material or using surface geotextile or moisture capturing hollows. - consult a qualified botanist on the type of plants suitable for different types of soils etc - source the recommended site specific plants</p>								


<p>Addressing illegal dumping through river clean ups (clearing of debris in water, clearing of blocked culverts and more)</p> <p>Dumping of yard waste into the seasonal zone of a wetland</p>	<p>Environmental education and presentations need to be carried out for participants of the watercourse clean ups; after the clean ups, there must be monitoring to ensure that no litter or any other pollutants are dumped in the watercourses; debris hindering water flow needs to be removed for watercourses; watercourse clean ups need to be more frequent; environmental education for residents is also a necessity.</p>	<p>1-2 km</p>	<p>Zone 2: River near Orlando West Park 26° 13' 49.39"S 27° 55' 08.32" E (Close proximity to Water Quality monitoring point MPD3)</p> <p>Zone 2: CVB wetland Orlando West Township to Kiptown (South Soweto) 26°13'52.32"S and 27°55'38.17"E</p>	  	<p>Trampling; temporary disturbance of fauna during the process</p>	<p>Soil, invertebrates, vertebrates and mammals</p>	<p>Operation</p>	<p>make use of small seedlings as they are likely to transplant more successfully than large ones;</p> <ul style="list-style-type: none"> - It is advisable to plant when the wet season has begun in order to eliminate the need for watering plants; - monitoring is vital to ensure that the a thick layer of vegetation is successfully created with minimal environmental impact; <p>- Source equipment and machinery for the clean up - remove all debris from the watercourses that hinders water flow</p>
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					<p>Zone 1 of CVB wetland</p> <p>Zone 3</p>				<ul style="list-style-type: none"> - Proper wetland clean up procedures must be followed. - Environmental education and presentations through training need to be carried out for participants of the watercourse clean ups; - incorporate the watercourse management environmental education programme as part of the existing community environmental awareness for residents. - ensure strict monitoring after the clean ups so that no litter or any other pollutants are dumped in the watercourses; - regular watercourse clean ups need to be implemented; 	<p>Operational</p>							
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Preventing unsustainable reed harvesting	Harvesting seasons need to be implemented and enforced,	100 m ²		Wetland will be able to perform important functions such as flood attenuation, sediment control, water purification, provision of habitat for fauna and avifauna Wetland will be able to perform important functions such as flood attenuation, sediment control, water purification, provision of habitat for fauna and avifauna	Soil, water quality; fauna; water flow	Operational and Decommissioning	<ul style="list-style-type: none"> - determine reasonable harvest yield for the site; - reasonable yields should also be set; - implement educational awareness campaign on sustainable reed harvesting methods; - Regulate Harvesting: should only be allowed at certain times during certain conditions; - fines should be set for illegal harvesting as determined by the authorities and by-laws. - enforce by-laws
Soil and ground movement during rehabilitation activities in stream areas.	Archaeologist to check initial site clearance with construction crew for possible heritage resources.	Most cases less than 5000m ²		Disturbance of unidentified heritage resources – chance finds Destruction of undiscovered subsurface heritage resources during construction activities. The severity of the impact on heritage resources found during construction	Heritage	Construction and Operational	<ul style="list-style-type: none"> - Site Assessment by Archaeologist - Where any significant resources are found the archaeologist must assess and make the appropriate mitigation requirements. - Stop construction if any heritage resources – such as graves, human remains or fossils are identified.

<p>Installation of fencing and gates for access control:</p>	<ul style="list-style-type: none"> Excavation of poles Casting for foundation of poles Construction camp may be required for storage of construction material Vegetation cleared for the construction of contractor camp Delivery of material 	<p>1-2km</p>	 	<p>Damage to top soil; Siltation; Compaction of soil / rutting</p>	<p>Excavation Casting of foundations for poles Delivery of material</p>	<p>Construction</p>	<p>Material required for fencing must be stored at a clearly demarcated area like the contractor camp. This camp must be located close to the area earmarked for infrastructure like ablution facilities in order to centralize the impacted area.</p>
<p>Erosion Control:</p>	<ul style="list-style-type: none"> Re-vegetation of bare areas; this aspect is deemed a positive impact as vegetation provides support for loose material. 	<p>1-2km</p>		<p>Construction of berms Storm water structures re-vegetation of bare areas</p>		<p>Construction & Operational</p>	<p>Activities within 500m measured from the center of the stream are deemed water uses in line with Section 21(c) of the NWA. Berms and storm water channels must be considered during the construction phase in order to divert clean runoff from the external catchment away from the disturbed areas.</p>
<p>Storm Water and Flood Management: Construction of Berms Storm water Structures.</p>	<ul style="list-style-type: none"> Address issue of residential areas within the 1:100 year flood area Install flood protection berms Maintenance of hydraulic structures 	<p>1-2km</p>	 <p>Waypoint 917 in Zone 4</p>	<p>Houses located within the 1:100 years flood lines pose a risk. Reduction in design capacity of the culvert</p>	<p>Location of infrastructure in the flood lines Maintenance of hydraulic structures Infilling of excavation</p>	<p>Construction & Operational</p>	<p>A maintenance schedule for clearing silt at the culvert crossing must be designed and implemented. Flood protection structures like attenuation walls must be designed</p>




Deterioration of water quality:	Water quality control measures must be implemented from the source of pollution. (mining and related activities) - Construction activities are associated with the generation of dust. - Dust suppression measures must be in place at construction camp sites. - Water pollution from failing waste water treatment plants. - The sewage treatment facilities must be designed and managed in such a manner that the final effluent complies to the receiving water quality objectives. - conduct audit to assess the sewage design capacity and treatment plants infrastructure if	1-2km	Next to Fleurhof dam in Zone 4 River near Orlando West Park 26° 13' 49.39"S 27° 55' 08.32" E (Close proximity to Water Quality monitoring point MPD3) Thokoza Park	(see Figure 3.1-6) 	due to silted up culvert crossings	- Mine related water quality impacts - Blocked Sewer lines and Waste Water treatment plants. - Illegal Waste Disposal - Residential Development Activities	Construction & Operational	and constructed for residential dwellings located within the flood risk areas. Apply the municipal stormwater management by-laws and guidelines Ensure Proper water resource protection measures Enforce Section 19 of NWA which places a duty on everyone to avoid pollution and degradation of water resources. Implement construction site environmental impact management procedures including dust suppression; oil spills management; soil erosion control etc. Conduct public awareness educating people about importance and function of water resources i.e. wetland Ensure Proper Waste Management Measures.
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	<p>suitable for the population of Soweto.</p> <ul style="list-style-type: none"> • Water pollution from dense settlements - Waste collecting and sorting measures must be implemented at dense settlement. • New residential developments - These activities are still at the construction phase. Construction activities are associated with the generation of dust. - Dust suppression measures must be in place at residential development sites. 					<p>Decommissioning</p> <p>Environmental education and presentations need to be carried out for participants of the watercourse clean ups; after the clean ups, there must be monitoring to ensure that no litter or any other pollutants are dumped in the watercourses; debris hindering water flow needs to be removed for watercourses; watercourse clean ups need to be more frequent; environmental education for residents is also a necessity.</p>
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<p>Disposal of domestic solid waste and building rubbles</p>	<p>Address the disposal of domestic waste and building rubbles</p> <ul style="list-style-type: none"> • Generation of waste:- <ul style="list-style-type: none"> - Waste will be generated during the construction and operational phases. - Construction waste will be generated during the establishment of parks. - Waste management at source - Waste must be temporarily stored in properly marked/colour coded bins. • Collection of Waste <ul style="list-style-type: none"> - Spillages may occur between collection, transportation and disposal. - Waste must be collected by a competent entity for safe disposal. Spillages must be remediated as soon as possible. • Disposal of waste. <ul style="list-style-type: none"> - Waste must be disposed of at registered water disposal sites. 	<p>1-2km</p>	<p>Stream 3 within Dorothy Nyembe Park 26° 13' 19.74"S 27° 52' 46.14" E (Close proximity to Water Quality monitoring point MPJ)</p> <p>Thokoza Park within catchment 4. -26, 263267S and 27,880685E</p>	   		<p>Construction & Operational</p>	<ul style="list-style-type: none"> • Develop a waste management plan for each site to include waste collection, temporal storage, transportation and waste processing (recycling, reuse or disposal) • Implement Waste collection and sorting from the source. • Ensure Proper Waste Management Measures. • Implement Community Waste Management Awareness programme regarding importance and function of water resource
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	<ul style="list-style-type: none"> • Hazardous waste management - storm water contamination - Improper waste management, results in storm water which gets in contact with waste will be contaminated. - Hazardous waste like grease and oil may impact on surface runoff during storm events. • Actively enforce restrictions and by-laws on dumping in the wetland and the riverine systems. 							
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Table E.3.1-2: Site Specific Rehabilitation interventions

 <p>Photo B. 1-2. (WP 539: S26°14'27,3"; E27°52'45.8). Livestock grazing in Zone 2</p>	<p>WP 539:</p> <ul style="list-style-type: none"> • Address livestock overgrazing. - Determine the area grazing capacity. - Research on grass and tree species to be planted. - Remove invasive alien species. - Re-vegetate area with seedlings of preferred indigenous species. - Fence off special areas for grazing. - Develop a livestock grazing management with specific time slots and durations. - Develop strict procedures and systems to be in place for effective management of overgrazing. 	
 <p>Photo B. 1-3. (WP 540: S26°14'15,29"; E27°52'35) Open dumping areas Zone 1</p>	<p>W540:</p> <ul style="list-style-type: none"> • Address illegal dumping - clean up area through litter picking. - waste sorting according to waste streams. - waste collection, transportation and disposal to legal landfill site. - recyclable waste material transferred to an authorised waste recyclable material processing facility by an accredited waste removal contractor. - clearing and leveling of site for possible park development. - install fence and gate for park - Prepare site for greening (grass planting, tree planting, seed planting - Ablution facilities construction - Picnic and braai area construction - Installation of storm water management structures - Installation of playing equipment; - Placement of benches and waste collection bins and signage 	

 <p>Photo B. 1-4. (WP 542: S26°14'29.06"; E27°51'53.9) Open Space areas proposed for the development of a park in Jabulani.</p>	<p>WP 542:</p> <ul style="list-style-type: none"> • Address illegal dumping <ul style="list-style-type: none"> - clean up area through litter picking. - waste sorting according to waste streams. - waste collection, transportation and disposal to legal landfill site. - recyclable waste material transferred to an authorised waste recyclable material processing facility by an accredited waste removal contractor. • Development of a park <ul style="list-style-type: none"> - clearing and levelling of site for possible park development. - install fence and gate for park - Prepare site for greening (grass planting, tree planting, seed planting - Ablution facilities construction - Picnic and braai area construction - Installation of storm water management structures - Installation of playing equipment; - Placement of benches and waste collection bins and signage 	   <p>Photo B. 1-5. (S26°14'27.3"; E27°52'47.4) An example of the proposed park to be developed in Jabulani.</p>
	<p>WP 917:</p> <ul style="list-style-type: none"> • Storm water management infrastructure <ul style="list-style-type: none"> - excavate around the damaged storm water management infrastructure - removal of damaged infrastructure - repair and replace damaged infrastructure - refilling of excavated areas - proper demarcation of repaired area 	

 <p>Photo B. 2-3. (WP 917): Damaged storm water outlet infrastructure.</p>		<p>- add topsoil and re-vegetate</p>
 <p>Photo B. 2-5. (WP 924): Building Rubble along Fleurhof Dam</p>	<p>WP 924:</p> <ul style="list-style-type: none"> • <u>Address illegal dumping of rubble waste</u> - Sort the rubble waste into waste streams - remove and clear unusable waste stream for disposal - collect and transport unusable waste to a legal waste disposal site through an accredited waste contractor - disposal at registered landfill site - re-use the recyclable rubble waste material such as rocks for construction of gabion structures - transport to area closer to gabion construction site or nearest stockpile site and fence - fence off the area - remove alien species plants - re-vegetate with indigenous grass and tree species 	

 <p>Photo B. 2-2. (WP 915): Water extraction by a water pump truck at Fleurhof dam. Availability of Water use license to be established.</p>	<p>WP915:</p> <ul style="list-style-type: none"> • <u>Address water extraction from the lake</u> <ul style="list-style-type: none"> - determine availability of water use license for extraction - determine purpose for water extraction is it municipal approved and private with a permit issued for extraction. 	
 <p>Photo B. (WP 928): Development and land clearing close to the western side of Fleurhof Dam in Zone 4.</p>	<p>WP 928:</p> <ul style="list-style-type: none"> • <u>Address development within the proximity of the da</u> <ul style="list-style-type: none"> - check the availability of the EMP for the development project - check how they will address the impacts to the surrounding environment - establish their compliance to the EMP - liaise with the relevant municipality department of compliance and enforcement - establish links between similar environmental projects where feasible 	

Alternative 1

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
Development of parks and wetlands rehabilitation	Same as proposal			
Demarcate special areas for livestock grazing to address overgrazing in Zones 2 and 3	High - Uncontrolled access to public space presents safety risk to public members and also the overgrazing of grass within the picnic sites. Although damage will be only localised to areas within Zone 2 and Zone 3.	Access control with fence and a lockable gate to allow a specific number of livestock only at certain times preferably after public has left the area for safety and hygiene purposes. Monitoring of grazing periods and time crucial to ensure proper maintenance of the facility.	Low	Shared open space with animals without proper animal control can lead to Public safety at risk especially children in the park or picnic area. Damage to grass and trees within the park especially the picnic site can be severe.

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
Development of parks and wetlands rehabilitation	Same as for proposal			
Demarcate special areas for livestock grazing to address overgrazing in all Zones	High - Same as Alternative 1, except the damage will be on a much larger scale (Zones 1-4) opposed to being localised only in Zone 2 and 3.	Access control with fence and a lockable gate to allow a specific number of livestock only at certain times preferably after public has left the area for safety and hygiene purposes. Monitoring of grazing periods and time crucial to ensure proper maintenance of the facility.	Low	Shared open space with animals without proper animal control can lead to Public safety at risk especially children in the park or picnic area. Damage to grass and trees within the park especially the picnic site can be severe.

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
Development of parks and wetlands rehabilitation	Same as for proposal			
Demarcate special areas for livestock grazing to address overgrazing in Zones 2 and 3	Same as Alternative 1			

<p>Installation of different gabion types at Zone 1, Zone 2 and Zone 3; Zone 1 - Gabions Zone 2 - Box gabions Zone 3 - Gabion mattresses (Stone Gabions construction and installation)</p>	<p>Medium - Dredging for installation of gabions; trampling; excavation of soil and vegetation, impeding of water flow;</p>	<p>Gabions preferably used with geotextiles to reduce water velocities and to recapture river bed sediment; during construction of gabion structures, the correct height, shape and foundation will be relevant to site being rehabilitated; qualified engineers will be consulted on appropriate gabion structures and installations; microscopic organisms and invertebrates will obtain new habitat under rocks within habitat; once gabions are installed properly, vegetation will regrow and sedimentation and erosion will cease</p>	<p>Low -</p>	<p>Riparian zone banks and vegetation; flow regime; sedimentation; water quality, habitat loss for invertebrates and microscopic organisms living under rocks</p>
<p>Installation of River mattress</p>	<p>Medium - Dredging for installation of gabions; trampling; excavation of soil and vegetation.</p>	<p>Riparian zone banks and vegetation; flow regime; sedimentation; water quality. </p>	<p>Low -</p>	<p>River Mattresses preferably used with geotextiles to reduce water velocities and to recapture river bed sediment; during construction of river mattress structures, the correct height, shape and foundation will be relevant to site being rehabilitated; qualified engineers will be consulted on appropriate river mattress structures and installations; once river mattresses are installed properly, vegetation will regrow and sedimentation and erosion will cease</p>

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

MAP OF ZONE 4 - OBSERVED IMPACTS AND AREAS TO BE REHABILITATED



Figure E.3.1-1. A map showing the specific waypoints of impacts within zone 4 of the study area.

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

1. Hydrological Assessment

The hydrological Impact Assessment study was conducted in line with the requirements of the National Water Act, 1998 (Act 36 of 1998) which provides for the protection, usage, development, conservation, management and control of the country's water resources in an integrated manner. The study was based on a holistic approach where previous research data and existing data from monitoring points as well as water samples were used to analyse the water quality and composition of the Middle Soweto WMSU wetland system. The water quality findings of Catchment 2 which is located on a different water system upstream of the Klipspruit was found to have high concentration of metals, Electrical Conductivity (EC), TDS and Sulphates (SO₄). During the site visit, a distinct difference with catchment 2 is that a unique blackish grey colour was observed, leading to an assumption that stream 2 has effluent of sewage though point source of sewage plant was not observed. This assumption was however further confirmed by the analysis of Ammonia and Phosphate which showed relatively high concentrations in comparison with other monitoring points.

2. Geohydrological Assessment

Groundwater characterisation was based on the evaluation of existing boreholes mainly from the National Groundwater Archive (NGA) of the Department of Water and Sanitation (DWS). A total of nine (9) existing boreholes were identified from the NGA in the vicinity of the study area. None of the boreholes could be located in the field, this being attributed to the age of most of the boreholes which were drilled between 1936 and 2001. Residential houses have sprouted where these boreholes existed. Their information, however, still gives a good idea of the groundwater situation in the area.

Lack of adequate water level elevation data precluded the construction of a piezometric surface map that would show the groundwater flow patterns at the site. Under these circumstances, it is assumed that the water table mimics surface topography, hence groundwater flows from topographic highs towards topographic lows.

Groundwater quality could not be evaluated due to lack of data. New boreholes will have to be drilled to generate such information.

The conclusion is based entirely on the evaluation of existing data from 9 boreholes in the study area, coupled with a hydrocensus. No new boreholes were drilled in this investigation. The main conclusion derived from the study is that the potential impact of groundwater on the wetland could not be determined due to lack of data.

3. Biodiversity Assessment

The major potential limitation associated with the project is the narrow temporal window allocated for sampling. Ideally, a site should be visited during seasons optimal for the identification of the full complement of plant and animal species present in an area. However, this is rarely possible due to time and cost constraints and therefore, the representation of the species sampled at the time of the site visit should be critically evaluated.

Another limitation is that regarding some of the plant species that have no foliage above ground, and for all practical purposes disappear during the dry season when they are dormant, and only reappear after the annual spring rains, some birds migrate, insect and small mammals are inactive, and bullfrogs are buried deep in winter.

To overcome these limitations, the site visit took place in the autumn season. This season is marked by slow rainfall and warm sunshine which are both favourable for plant and animal life. Animals have not gone into hibernation during this season and the warm temperatures during the day warm the ground making it softer and more yielding to plants. According to Pooley (2005), many herbaceous plants in winter die back and reptiles hibernate (Jacobsen, 2005) while many amphibians are still out to mate in the autumn rainfall (Du Preez & Carruthers, 2002).

Therefore, the fauna and flora assessment undertaken by SAZI in autumn offers a representative sample of the species diversity on site as the time of assessment offers optimal conditions for fauna and flora observation. As such no additional site visits are necessary in other seasons as most fauna and flora will either be in hibernation or dormant.

The lists of fauna and flora for the site were based on those observed at the site as well as those likely to occur in the area based on their distribution and habitat preferences. This represents a sufficiently conservative and cautious approach which takes the study limitations into account.

4. Wetland Assessment

The following assumptions and limitations were applicable to the study conducted:

- Due to the extent of the study area, use was made of aerial photographs, digital satellite imagery, as well as provincial and national wetland databases to identify areas of interest prior to the field survey. Any additional wetland areas or watercourses noted during the field survey were also assessed and added to the number of survey points. Although all possible measures were undertaken to ensure all wetland features and riparian zones were assessed and delineated, some smaller ephemeral features may have been overlooked.
- The wetland delineations as presented in this report are regarded as a best estimate of the wetland boundaries based on the site conditions present at the time of assessment. It must be noted that due to the extent of the study area extensive use was made of digital satellite imagery to delineate wetland boundaries and not all areas were delineated in detail.
- 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 wetlands will need to be surveyed and pegged according to surveying principles. The delineations are however deemed sufficiently accurate to ensure that the wetland resources are adequately protected if the management and mitigation measures of this report are adhered to and adequate buffers are implemented.
- In addition, significant transformation of the vegetation communities and soil profiles arising from historical and current agricultural practices as well as mining activities was apparent. As a result, identification of the outer boundary of temporary wetland zones and riparian zones proved difficult in some areas and in particular, in the areas where wetland conditions and riparian zones are marginal. Therefore, the wetland/riparian delineations as presented in this report are regarded as a best estimate of the wetland/riparian boundaries based on the site conditions present at the time of assessment.
- Wetlands and terrestrial zones create transitional areas where an ecotone is formed as vegetation species change from terrestrial to wetland species. Within this transition zone some variation of opinion on the wetland/riparian boundary may occur.
- Aquatic wetland and riparian ecosystems are dynamic and complex. Some aspects of the ecology of these systems, some of which may be important, may have been overlooked.

5. Heritage resource Assessment

The following assumptions and limitation apply to this study:

- Not detracting in any way from the comprehensiveness of the fieldwork undertaken, it is necessary to realize that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the subterranean nature of some archaeological sites and the current dense vegetation cover. As such, should any heritage features and/or objects not included in the present inventory be located or observed, a heritage specialist must immediately be contacted.
- Any such observed or located heritage features and/or objects found during construction/operation may not be disturbed or removed in any way until such time that the heritage specialist has been able to make an assessment as to the significance of the site (or material) in question. This applies to graves and cemeteries as well. In the event that any graves or burial places are located during the development, the procedures and requirements pertaining to graves and burials will apply as set out below.
- The fieldwork consisted of general site visits as detailed studies of each of the areas of direct impact was not possible due to wetland and dense vegetation and the general security issues associated with degraded urban environments in the Gauteng Province.

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

D. Decommissioning Phase (closure and handover)

Site Closure

- Demolish construction camp on site without impact to environment
- Remove any soil or plant material stockpiles
- Demolish the temporal plant and seedlings nursery
- Site clean up must be undertaken
- Remove all waste material types and dispose properly and at registered landfill site.
- All equipment and machinery must be properly removed from site
- Remove all sanitation facilities from site
- Ensure the closed site does not present any safety risk to human or environment
- Ensure proper project handover to relevant community authorities for monitoring and maintenance

A detailed summary of the calculated significant rating for identified impacts and their mitigation interventions are given in Table 2.1-1

D. DECOMMISSIONING PHASE					
<p>Site Closure</p> <ul style="list-style-type: none"> Demolish construction camp on site without impact to environment Remove any soil or plant material stockpiles Demolish the temporal plant and seedlings nursery Site clean up must be undertaken Remove all waste material types and dispose properly and at registered landfill site. All equipment and machinery must be properly removed from site Remove all sanitation facilities from site Ensure the closed site does not present any safety risk to human or environment Ensure proper project handover to relevant community authorities for monitoring and maintenance 	<ul style="list-style-type: none"> Soil disturbance and exposure from demolition works Visual impact - Dust generation due to demolition works Loss of soil and vegetation Soil pollution and groundwater pollution Water quality impacts of demolition works near water features Construction noise - Demolition activity will generate noise from vehicles, machinery, equipment and personnel Loss of income to temporary employed community members 	<p>Soil</p> <p>Air quality</p> <p>Soil and biodiversity</p> <p>Surface water quality</p> <p>Ground water quality</p> <p>Loss of employment and source of income</p>	Decommissioning	Medium	<p>Implement proper site closure procedures and guidelines as per the approved EMPr</p> <p>Engage municipality Parks and Environment Departments responsible for maintenance of wetlands and parks in the area to provide opportunities to the trained community members. The team members might be used in the monitoring of the rehabilitated areas and future wetland rehabilitation programmes to be implemented by the municipality.</p>

Alternatives

Any alternative that is feasible in the context of the project, that is subject to the condition that it is subject to the same level of assessment and that it is subject to the same level of assessment as the proposed project.

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
Development of Parks and wetlands rehabilitation	Same as proposal			
Demarcate special areas for livestock grazing to address overgrazing in Zones 2 and 3	Low	Proper handover to Park management to continue with the livestock grazing programme as per training and guidelines within the EMPr	Positive	Severe irreversible damage to soil and vegetation that can lead to increased water runoff and increase soil erosion and further degradation of the environment.

Alternative

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts	Risk of the impact and mitigation not being implemented

			after mitigation:	
Development of Parks and wetlands rehabilitation	Same as proposal			
Demarcate special areas for livestock grazing to address overgrazing in all Zones	Same as Alternative 1			

Table 10: Potential Impacts

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
Development of Parks and wetlands rehabilitation	Same as proposal			
Demarcate special areas for livestock grazing to address overgrazing in all Zones	Same as Alternative 2			
Installation of different gabion types at Zone 1, Zone 2 and Zone 3; Zone 1 - Gabions Zone 2 - Box gabions Zone 3 - Gabion mattresses (Stone Gabions construction and installation)	Negative - low	<ul style="list-style-type: none"> Gabions used including those used with geotextiles must be of the correct height, shape and foundation and be relevant to site being rehabilitated (Annexure C); Qualified engineers must be consulted on appropriate gabion structures and installations; Once gabions are installed properly, vegetation will regrow and sedimentation and erosion will cease Continued monitoring and maintenance of the structural integrity of the gabion structure is recommended 	Positive	<ul style="list-style-type: none"> Negative impact to the riparian zone banks and vegetation; Negative impact to the flow regime; increased sedimentation; Poor water quality, habitat loss for invertebrates and microscopic organisms living under rocks Continued degradation of water quality and wetland health status

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

[Redacted]
[Redacted]
[Redacted]
[Redacted]
[Redacted]

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

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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:

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.

Alternative 1 (proposal)

The development of parks and implementation of the wetland rehabilitation interventions will entail several activities that will impact negatively on the environment should the proposed mitigation measures not be considered or implemented.

- Clearing of vegetation for construction site and for park development

The clearing of the site for the construction of the Construction camp and the development of a park will result in loss of vegetation and soil from the ripping or loosening of soils, grading and levelling of the landscape. This may present potential soil erosion. The current earmarked sites for the proposed development of community parks are mainly characterised by illegal dumping of general waste, livestock carcasses, building rubble and burying of eggshells and egg cartons within the area.

The impact is considered to be moderate and can be managed through the implementation of mitigation measures. It is recommended that the bare surfaces must be kept and managed as small as possible. To further reduce any impacts during the construction phase, all personnel must use the construction environmental management programme guidelines to reduce machinery and personnel noise levels to low. Soil erosion and soil pollution can be minimised by implementing the Construction site environmental management programme and guidelines. Dust suppression measures to be implemented. In order to preserve the indigenous vegetation where possible the site for construction must preferably be located in a area where alien invasive plant species are demarcated for removal as part of the rehabilitation intervention. And also to address the issue of illegal dumping in the area, the transformation of these dump sites into recreational communal areas will remove the access for illegal dumping and promote proper waste collection and disposal management practice and behaviour within the community through education and awareness training and campaigns. Sanitation facilities must not be located within 50m of any water resources or water drainage areas. Facilities must be regularly checked and serviced regularly to reduce risk of soil pollution, surface water and groundwater pollution.

The change in land use will have a positive impact to the environment and the community. Whilst the loss of vegetation impact will be short-term the development proposed will have much more desirable and long-term benefits. Revegetation will be done by planting grass, shrubs and trees within the picnic areas and the greening of the park will focus on indigenous water-saving grass and plant species to conserve water. Trees will be used for shade and as windbreaks for the park especially the picnic areas. Live fencing through use of climbers and shrubs will enhance the overall aesthetic look of the area as depicted in Photo E.5.1-1 below.

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Photo E.5.1-1. Current status of the site proposed for the development of a Park in Zone 1 Jabulani area.



Photo E.5.1-2. Examples of the Proposed change in land use into a Developed Community Park Area.

- Installation of fencing and gates around the perimeter of the park

A perimeter fence and gates are required to restrict and control access to the parks. The aspects associated with the installation of fencing and gates include impacts such as the excavation for poles. The excavation of poles is usually shallow and covers small surface areas. However, depending on the length of the area to be fenced off may result in cumulative impacts as the number of poles is directly proportional to the length of the barricade. The casting for foundation of poles will produce construction waste such as during the mixing of cement for casting support for the poles. The delivery of material for the fencing and gates to the construction camp present additional impacts related to the construction heavy machinery and the vehicles.



Photo E.5.1-3. Open dumping site in Zone 1



Photo E.5.1-4. Example of installation of excavation for installation of cement fence structures.



Photo E.5.1-5. An example of excavation work during tree planting and park development.



Photo E.5.1-6. A fenced in park for controlled access to also ensure the safety of the community.

Erosion Control and Re-vegetation of bare areas

The construction phase of the park development presents impacts of potential soil erosion and the bare surfaces must be re-vegetated to reduce the impact. The greening component of the park development will ensure that the loose soil is controlled and the overall aesthetic look of the area will have a significantly high positive impact to the environment and the community.



Photo E.5.1-7. Bare surface resulting from the removal of vegetation and excavation within the temporary zone of the wetland at Klipspruit Valley Road section of WMU



Photo E.5.1-8. Example of a park with grass, trees and built walkways developed on the bare surface to combat against soil erosion.

Construction of Berms Storm water Structures

The change in the surface terrain will present an increase water run off and the installation storm water structures and construction of berms is necessary. The water from external catchment areas such as adjacent residential dwellings, must be controlled by storm water channels

- Storm Water and Flood Management

The proposed park is close to the riverine system and thus storm water and flood management is crucial. To ensure that the impact of installation to the wetland area is reduced a few aspects must be taken into consideration. The location of infrastructure must take into account the floodlines. The floodlines were delineated for the entire WMU in order to highlight the risks associated with activities taking place within the 1:100 year flood areas. There are some residential areas that fall within the 1:100 year flood area and the impact is moderate. The impact and the risk can be lowered with the implementation of the proposed mitigation measures that include the maintenance of hydraulic structures as the silted up culverts result in poor drainage as the design capacities are compromised. The culvert crossings located upstream and downstream of the proposed park area must be maintained in order to avoid water attenuation and/or ponding at the park area and all the excavation sites must be filled in. A maintenance schedule for the clearing of silt must be designed and implemented. Flood protection structures like attenuation walls must be designed and constructed for residential dwellings located within the flood risk areas.



Photo E.5.1-9. Round culverts blocked with litter and silt within Thokoza Park.



Photo E.5.1-10. Examples of proposed interventions for walk bridges within the park.

- Deterioration of water Quality

A number of activities during the construction and operation phase of the development of parks will present impacts that may result in the deterioration of water quality if not properly managed. Some of the aspects associated with the deterioration of water quality within the study area include water pollution from industrial activities like mining and related activities. The defunct mines within Zone 4 of the study area may result in the deterioration of water quality. The water quality results for a sample collected at Monitoring Point A by the Specialist indicates mining related impacts (Appendix G2). Recommendations of implementing water quality control measures from the source of pollution must be considered. Additional impacts to the water quality include water pollution from failing wastewater treatment plants that are poorly managed and the blockages of the sewer lines pose a risk to the receiving water body. The densely populated settlements without proper waste management systems in place results in high rate of waste illegal dumping within the wetland area which increases the water pollution. The moderate impact can be lowered with the implementation of mitigation measures such as ensuring that the sewage treatment facilities are designed and managed in such a manner that the final effluent complies to the receiving water quality objectives. To address the illegal dumping issue through the implementation of waste collecting and sorting measures within the densely populated settlement. The development of new residential areas also add to the water pollution impacts such as generation of dust and the construction rubble. Construction site Operational management guidelines must be implemented to mitigate the impacts. In order to ensure compliance to water protection legal requirements, proper water resource protection measures like "Polluter Pays Principles" must be enforced.



A: Point Located at Stream 4 at Mshenguville park where the development of a park is recommended.



B: Point located Upstream of the tributary of Klipspruit and Downstream of Florida Dam.



C: Point located on Stream 4 at Thokoza Park, downstream of Moroka Dam.

D: Waste dumping on the stream channel in Zone 1

Photo E.5.1-11. Water Quality status at various points of the Study Area observed close to the water quality monitoring points.

- Generation of domestic waste and building rubble.

Several illegal waste disposal sites were observed identified throughout the study area assessed and has negative effects on the water quality, vegetation life, aquatic life and aesthetic impacts on parks and dams within the area. It is also believed that illegal dumping is one of the key main causes of water pollution within the Klip-Middle Soweto WMU.

Waste will be generated during the construction and operational phases during the establishment of parks. Spillages of waste may occur between collection, transportation and disposal. If waste is not properly managed, storm water which gets in contact with waste will be contaminated. Hazardous waste like grease and oil may impact on surface runoff during storm events. The impact rating of the impacts is low without mitigation and can be altered to further minimised and monitored with the implementation of proposed mitigation measures. Proper management of waste is required so as to protect the environment and the residents from its harmful impacts if not properly managed. Some recommendations include the sorting of waste at source with proper temporal storage of waste in appropriate and properly marked/colour coded bins. Collection of waste must be done by a competent entity for safe disposal and spillages must be remediated as soon as possible. Waste must be disposed of at registered water disposal sites. Environmental education and presentations need to be carried out for participants of the development of parks and community clean ups; after the clean ups, there must be monitoring to ensure that no litter or any other pollutants are dumped in the area and watercourses; debris hindering water flow needs to be removed for watercourses; watercourse clean ups need to be more frequent; community based environmental education for residents is critical.



Photo E.5.1-12. Littering within a wetland observed in Zone 1 of study area.



Photo E.5.1-13. Littering observed within a wetland Zone 2.



Photo E.5.1-14. Illegal dumping and burning of livestock carcasses seasonal and temporal zones of a wetland in Zone 3.



Photo E.5.1-15. Illegal Dumping next to Fleufhof dam in Zone 4



Photo E.5.1-16. Community waste education programmes including waste collection must be implemented.



Photo E.5.1-17. Examples of proposed interventions for waste collection and separation at source. Use of multi-coloured waste bins for collection of recyclables.

WETLAND REHABILITATION

- Stone Gabion construction and installation (gabions, box gabions, basket gabions and mattress gabions)

Study area has a number of sites within the wetland that have severe river bank erosion. The installation of the gabion structures will present some impacts including dredging during installation; trampling by the site workers on the vegetation; excavation of soil and vegetation and impeding of water flow. Gabions preferably used with geotextiles to reduce water velocities and to recapture river bed sediment. During construction of gabion structures, the correct height, shape and foundation will be relevant to site being rehabilitated. Qualified engineers must be consulted on appropriate gabion structures

and installations. Microscopic organisms and invertebrates will obtain new habitat under rocks within habitat. Once gabions are installed properly, vegetation will regrow and sedimentation and erosion will cease.



Photo E.5.1-18. Various sections on the Klipspruit Valley Road to Chris Hani Road are eroded and need gabion support



Photo E.5.1-19. Gabion baskets can be used to stabilise banks



Photo E.5.1-20. The Jabavu section also has various points needing gabion structures.



Photo E.5.1-21. Box gabions can be used to stabilise river banks.



Photo E.5.1-22. The Jabavu section highly eroded and in need of gabion support structures.



Photo E.5.1-23. Gabion mattress can be useful at this particular slope as it is slanting.



Photo E.5.1-24. Gabion collapse at the Jabavu section.



Photo E.5.1-25. Gabion baskets are more durable.



Photo E.5.1-26. Gabion collapse and erosion at Dorothy Nyembe Park.



Photo E.5.1-27. Gabion mattress can be useful at this particular slope as it is slanting.

The severity of the impact of the intervention is moderate for a short term duration. The implementation of the proposed mitigation measures will lessen the intensity of the impact significantly low and this will be only during the operation phase.

- Mulching

Heavily eroded river banks and slopes need to be stabilised. Slopes to be rehabilitated need to be stabilised with a layer of geotextile then seeded making them ready for mulching. The local indigenous trees such as *Acaica karoo* can be used as valuable and readily available sources of mulch. The tree thorns are said to be a very valuable resource that must be carefully harvested and have no visible impact to the environment. The mulching process presents significantly low impacts to the wetland during the construction and operation phase and is short-term of trampling, harvesting of mulch and potential loss of vegetation. With implementation of proposed mitigation measures, the impacts will be maintained at a low intensity. Mulch from trees such as *Eucalyptus* must however be applied when dry as the leaves and branches have a chemical impact on soil. Spanish reed (*Arundo donax*) is another potential source for mulching. Adequate mulch material needs to be available at all times. Harvesting of the trees can be done by cutting every third or fourth tree or large shrub about 300mm above ground so as to ensure that the habitat is not too drastically changed. All the cut branches of trees to be used as mulch must be fed through a motorised chip mulch machine which must be set to produce a rough mulch consisting of bits approximately 100-150mm long to form a dense mat on the surface. A layer of about 60 to 100mm should be a suitable layer of mulch but this needs to be tested on site to confirm whether it is suitable. It is important to note that a great deal of mulch will be required. It is also important to appreciate that the temporary loss of thorn trees and other shrubs is valuable for the rehabilitation work and that the cut trees will resprout with time. Mulching can be implemented at the Orlando West section of the WMU and the Klipspruit Road to Chris Hani Road section of WMU.

- Erosion Control Fences

Erosion was identified and observed in several sections of the wetland throughout the study area and use of soil erosion fences is highly recommended. The soil erosion control fences are said to comprise of simple low wire netting and jute geotextile fences with a thick mulch layer which can trap and slow run-off water and become a beneficial vegetated belt across degraded landscapes or stabilise small drainages and dongas. These fences can be used on slopes to treat small rills. These fences must be used with mulch for effective water control and microclimate creation. Fences with mulch check water flow and stabilise small dongas. When placing these mulched fences, it is imperative to work around existing vegetation. The use of fences is recommended because they are known to slow down the speed of destructive runoff water, they act as windbreaks by trapping windblown dust and seeds, they are quick to install, they allow water to pass through at a slow rate but plant litter and silt remain behind thus helping reconstruction of topsoil.

Erosion control fences can be installed by unskilled labour by following these steps:

1. A sturdy low fence of iron standards and wire netting is made across the flow of water and spaced approximately 3-5m apart;
2. A thick layer of mulch is then placed over the full length of the fence;
3. Geotextile must always be used together with wire netting;
4. On steeper slopes, the fences are installed netting in series down the slope.

The installation of soil erosion fences will present impacts such as damage to bank and slopes through excavation of topsoil for installation of metal stakes for fence (iron standard fence and wire netting) by digging holes on ground or slope and trampling from the site workers. The impact is significantly low to the wetland area to be rehabilitated. The implementation of proposed mitigation measures outlined above with fences to be used with mulch for effective water control and microclimate creation, ensuring that when placing mulched fences, the work will be done around existing vegetation and that with time trampled sections will quickly regrow.

The erosion control fences can be applied at the following sections of the WMU:

- Orlando West section;
- Klipspruit Valley Road to Chris Hani Road section;
- Diepkloof section; and
- Jabavu section.

- Sediment control

Sediment is a pollutant in its own right, causing turbidity in the water that limits light penetration and prohibits healthy plant growth on the river bed. Sediment also covers much of the river bed with a blanket of silt that smothers life. By covering up gravel and cobble, sediment destroys the spawning grounds and habitat of desirable fish species. Finally, sediment is an important carrier of a critical pollutant: phosphorus. This nutrient stimulates excessive algae growth in the water column. When the algae decompose, it depletes dissolved oxygen from the water, reducing the quality of life forms that are able to survive.

Many of the assessed points throughout the study area had high levels of sedimentation. The following methods are recommended to control and manage sedimentation. The following methods are cost-effective and easy to install:

1. Silt fence: it is a woven geotextile fabric fence with hardwood stakes attached. It is designed to trap silt behind the fabric;
2. Gravel bags: Used to filter large silt particles or reduce flow velocity;

Within the assessed points, sedimentation was observed to be caused by fallen trees and concrete structures such as pipes that have collapsed into the watercourse. These need to be removed to reduce sedimentation. The impacts of installation and use of gravel bags is deemed of low significance over a short term period of operation and will be easily mitigated upon implementation of proposed mitigation measures.



Photo E.5.1-28. Sedimentation observed within the Mofolo Park section of the WMU.



Photo E.5.1-29. Proposed use of gravel bags to combat sedimentation

The gravel bags need to be inspected prior to forecast rain, during extended rain events, after rain events and weekly during the rainy season. If the gravel bags are exposed to sunlight for a prolonged period, they will need to be replaced every three months due to the degradation of the bags by the sun; the bags will need to be reshaped and replaced as needed; sediment that will accumulate in the bags must be removed periodically in order to maintain the effectiveness of the bags. Inspection and maintenance must be carried out throughout the lifespan of the process.

- Treating footpaths

Footpaths were observed at various points of the assessed sections of the wetland and river. Treating footpaths is said to be a simple technique for preventing soil erosion and rehabilitating degraded landscapes. Mulching is used in treating footpaths as it protects the soil and creates favourable conditions for plant establishment. This method is suitable for flat surfaces and moderate slopes. Most footpaths across watercourses are flat. When applying this method, it is important not to remove any rooted plants in the paths. Water flow along the path also needs to be halted. Footpaths need to be rehabilitated because they channel runoff water and become dongas if not treated. Top soil and valuable water is lost along eroding paths and numerous networks of paths contribute to drying out of soil. Treating footpaths is cost-effective as no engineering equipment is necessary and unskilled labour can be used. This necessitates the rehabilitation of footpaths by following the steps below:

1. Hard capped soil along the paths can be loosened by using simple equipment such as a broad fork or mattock pick;
2. Jute geotextile (soil saver) is cut and laid along the paths;
3. The covered paths are then given a fairly thick mulch;
4. A complete treated footpath is the result.

The impact is significantly low and is a short term localised impact that can be mitigated with proper implementation of mitigation measures. This method of rehabilitation is only suitable for flat surfaces and moderate slopes; rooted plants on the paths to be rehabilitated should not be removed and the area being treated should also be demarcated so that people do not continuously trample on it.

- Preventing Overgrazing and animal trampling

The determination of the grazing capacity of the wetland is critical to reduce the intensity of overgrazing within the observed areas. It is said that on average, the grazing capacity of a wetland is 1.5 times higher than non-wetland areas although this depends on many factors such as the water regime and species composition of the wetland. In an area like Soweto where regular monitoring of grazing in wetlands is not possible, a fixed rotational grazing system of 14 days in and 24 days out of the wetland must be applied. Another important aspect in preventing overgrazing in wetlands is to discontinue all grazing when soils are waterlogged (as this is when erosion begins) until waterlogging ceases. When rotational grazing is applied, this means that trampling will also be minimised. Overgrazing affects the vegetation, soil, and water quality. The significance of impacts is low, short term and localised. In order to prevent overgrazing, a highly monitored and controlled livestock grazing programme within the public open areas would be ideal.

Rotational grazing will ensure that the wetland capacity for grazing is not exceeded and that animal trampling will be maintained at low levels as animals will not be grazing on the wetlands all the time. This also ensures that when soils are waterlogged, they cannot be worsened by trampling as animals will only graze when conditions are favourable.

- Invasive alien species control

A variety of Invasive alien plants were observed and identified within the study area. Invasive alien species not only pose a threat to biological diversity but to water security as well as the ecological functioning of natural systems. The removal of invasive alien species also increase water yield which is necessary in a water scarce municipality such as City of Johannesburg (Sazi, 2016).

A range of methods have been proposed to control invasive alien plants. These include:

1. Mechanical methods: burning or removing of alien invasive plants, felling;
2. Chemical Methods: using herbicides that are environmentally friendly;
3. Biological control: the use of species-specific diseases and insects from the country of origin of the alien plant;
4. Integrated control: the use of the combination of all three methods mentioned above. In most cases, this type of approach is necessary in preventing enormous impacts.

According to Sazi 2016, Mechanical methods are recommended in the removal of invasive alien plant species in the Klip-Middle Soweto Water Management Unit because these methods have been found to be the most successful and safest for the environment. Although they may be time consuming in larger areas and labour intensive, they are the safest. Also, the assessed points in this Water Management Unit are not very big for the use of mechanical methods. Chemical methods are easier to apply but may have unwanted effects on water resources. Although biocontrol methods have been proven to be safe and host-specific, they do not completely exterminate populations of their host plants because few host plants always survive. Biocontrol also works slowly by comparison to other techniques and take at least 5 years on average to establish successfully before attacking its host and damaging it.

An integrated approach of mechanical and chemical methods may be the best option for quick and effective invasive alien species eradication. For trees on slopes these options can be utilised:

1. Basal bark: Application of suitable herbicide in diesel can be undertaken to the bottom 250mm of the stem. These applications should be by means of a low pressure droplet spray from a narrow angle solid cone nozzle;
2. Hand pull: Grip the young plant by hand low done and pull (gloves are recommended);
3. Ring barking: Bark must be removed from the bottom of the stem to height of 0.75-1.0m. All bark must be removed to below ground level for best results. Where clean de-barking is not possible due to crevices in the stem or exposed roots are present, a combination of bark removal basal stem treatments should be carried out. Bush knives or hatchets should be used for debarking;
4. Frill: angled cuts downwards into the cambium layer can be made using an axe or bush knife through the bark in a ring. Ensure to effect the cuts around the entire stem and apply herbicide into the cuts.

For this control programme for alien vegetation, follow up control (control of root suckers, coppice growth etc.) and maintenance control (annual control to sustain low alien plant numbers) are compulsory.

Invasive alien control techniques that can be utilised in this Water Management Unit include the following:

- Most trees across the Management Unit can be felled and removed using chainsaws, bowsaws and brushcutters;
- The hand pull methods can be used to removed small shrubs and herbs such as the *Solanum mauritianum*;
- The assessed points had a number of mature alien invasive tree species that cannot be eradicated mechanically only. An integrated method is necessary for such trees as *Eucalyptus*, *Melia azedarach*, *Salix babylonica* etc. Felling and treating stumps with herbicide and follow-up removal of seedlings is essential. Biocontrol to reduce seed output is also crucial.
- The removal of weeds and alien invasive species in the permanent, seasonal and temporary zone of the wetland is imperative. Species such as *Tagetes minuta*, *Ipomoea purpurea*, *Canna indica*, *Solanum mauritianum*, *Salix* species (among others) were observed in the permanent and seasonal zone of the wetland. This has negative implications for the wetland as most of these species are alien invasives and drain the water in these zones which is essential for the survival of the wetland. Weeds also indicate that these zones are degrading. Removal of alien invasive plants and weeds in these zones is of primary importance. (See appendix 1 for a list of species occurring in different zones of the wetland).

The impact is rated moderate and the intensity can be lowered with implementation of the proposed mitigation measures.

Only herbicides registered for use on a specific species must be used; herbicides must only be sprayed during active growing of plants; plants need to be sprayed before the seeds are produced (namely between flowering and fruit set); herbicides must not be applied during the wet seas (before or after rain) as they will wash away into rivers and watercourses and contaminate them and manual removal using mechanised tools is effective in removal of dense stands of aliens.

- Soil bioengineering techniques

The most important objective of any rehabilitation programme is to establish a permanent and dense cover of soil protecting plants as quickly as possible. Soil bioengineering techniques refer to the use of a variety of plant species without any artificial materials. It is imperative that locally occurring plants are utilised as they have the best survival chance of conditions in degraded areas. All sowing (planting) must be followed by some form of micro-habitat treatment such as mulching with local plant material, surface geotextile or moisture capturing hollows. Seeding and sowing onto eroded sites only will NOT be successful. The priority in revegetation of riparian zones is the stabilisation of watercourse banks and channel plug development. It is for this reason that it is important to deliberately select and place plants with vigorous rooting growth characteristics that will accelerate natural plant succession. It is preferable to plant once the wet season has started as this eliminates the need for frequent watering. An alternative to seed germination is the uprooting of small seedlings between 40 mm to 10 mm high from an area where they are many. Small seedlings are likely to transplant more successfully than large ones.

The impacts of applying this methods as part of bank stabilisation include digging on banks and surrounding landscape when preparing soil for planting; trampling by site workers and the intensity is moderate and short term. The implementation of mitigation measures will ensure that the intensity of the impacts is managed.

- Addressing illegal dumping

Most of the sites assessed within the study area were polluted with litter and other aquatic and terrestrial debris. There was also chemical pollution affecting the watercourses such as toxic chemicals from soap used by people to do their laundry as well as human faeces observed at various points of the management unit and collapsed or overflowing sewage drains that need urgent attendance. Soaps and sewage (faeces) contain phosphates and nitrates that are harmful to water quality and thus harmful to aquatic life.

The amount of litter and waste produced daily in these areas is more than the municipality can collect daily. Without sanitation services, most residents utilise the rivers and wetlands for domestic purposes and for relieving themselves. Suggested measures are as follows:

1. All rivers and parks should have no dumping signs (although these have proved ineffective);
2. There should be cleaners and caretakers appointed at various sections of the management unit;
3. River clean ups should be more frequent;
4. Penalties and fines should be charged for non-compliance.

While addressing the impacts of illegal dumping some of the impacts will be during the construction and operation phase which will include site workers trampling during river clean ups that will entail clearing of debris in water and clearing of blocked culverts. The impacts are of low significance short term and should the mitigation measures not be implemented the impacts can be cumulative and lead to severe and detrimental negative impacts to the wetland ecological status especially the water quality. Environmental education awareness campaigns and workshops must be carried out for participants of the watercourse clean ups. After decommission phase, monitoring must be continuous to ensure that no litter or any other pollutants are dumped in the watercourses. Any obstruction objects that hinder water flow needs to be removed from the watercourses. Watercourse clean ups need to be more frequent and this can be aligned to the environmental education programmes for residents. Educational awareness and by-law enforcement are critical to the improved behaviour and health status of the river and wetlands within the study area.

- Unsustainable reed harvesting

Reed harvesting was observed as a means of income generation within the area where residents sold tables, chairs, placemats and baskets made from reeds. Mostly use bulrushes as the key material for manufacturing their goods. When comparing the number of hawkers selling this type of furniture to the amount of bulrushes observed at the assessed points, there are simply too many people harvesting them. Loss of reeds within the wetland means the wetland will be not be able to perform important functions such as flood attenuation, sediment control, water purification, provision of habitat for fauna and avifauna. In light of this fact, the following measures should be taken:

1. There should be times set aside for harvesting so that the reeds will have time to regrow;
2. There should be yields agreed upon;
3. There should be fines for illegal and over-harvesting;

However, these suggestions may not be practical as there are no reed police or law enforcement. The only way to ensure wetland survival is through educating the people around these wetlands on their importance and value. Whilst the impact is rated low over a short term period, long term overharvesting can be detrimental to the loss of wetlands within the area. The impacts intensity can be mitigated with proper and diligent implementation of recommendations that will also require full commitment and engagement of the municipality officials and residents within the area. Harvesting seasons need to be implemented and enforced, harvesting should only be allowed at certain times during certain conditions; reasonable amounts should be agreed upon.

Alternative 1 (Design and Method Alternative)

- Development of parks and wetlands rehabilitation

Same as proposal

- Demarcate special areas for livestock grazing to address overgrazing in Zones 2 and 3

Livestock grazing was observed in several places within the study area and the impact of overgrazing was evident. The impact of uncontrolled livestock grazing results in loss of vegetation leading to severe soil erosion and water runoff creating more eroded surface and gullies and wetland vegetation trampling. The open plan livestock grazing presents challenges in that uncontrolled access to public space presents safety risk to public members and also the overgrazing of grass within the picnic sites of the community parks. Mitigation measures proposed include monitored access control with fence and a lockable gate to allow a specific number of livestock only at certain times preferably after public has left the area for safety and hygiene purposes. Monitoring of grazing periods and time crucial to ensure proper maintenance of the facility. Although the damage will be only localised to areas within Zone 2 and Zone 3, the significance is rated high but can be reduced to low with the implementation of mitigation measures. Shared open space with animals without proper animal control can lead to Public safety risk especially children and the elderly in the park or picnic area. Damage to grass and trees within the park especially the picnic site can be severe.

Alternative 2 (Design and Method Alternative)

- Development of parks and wetlands rehabilitation

Same as for proposal

- Demarcate special areas for livestock grazing to address overgrazing in all Zones

Same as Alternative 1, except the damage will be on a much larger scale (Zones 1-4) opposed to being localised only in Zone 2 and 3. Implementation of mitigation measures will reduce the impact significantly.

Alternative 3 (Design and Method Alternative)

- Development of parks and wetlands rehabilitation

Same as for proposal

- Demarcate special areas for livestock grazing to address overgrazing in Zones 2 and 3
Same as Alternative 1.

- Installation of different gabion types at Zone 1, Zone 2 and Zone 3

The installation of soil erosion control structures in Zone 1 - Gabions; Zone 2 - Box gabions and Zone 3 - Gabion mattresses has been proposed as an activity to address soil erosion. The impacts result from the dredging for installation of gabions; trampling; excavation of soil and vegetation and impeding of water flow within the wetland. The use of gabions structures, correctly constructed and installed, preferably used with geotextiles to reduce water velocities and to recapture river bed sediment will ensure vegetation regrowth and sedimentation including erosion will cease. The impact is considered moderate and can be significantly lowered with the implementation of mitigation measures.

6. IMPACT SUMMARY OF THE PROPOSAL OR PREFERRED ALTERNATIVE

For proposal:

- Development of parks in earmarked zones. Different types of parks will be developed per zone, dependent on the need of the community and best rehabilitation intervention for the area. The activities include:
 - construct and demarcate picnic area with braai facilities
 - construct ablution facilities
 - construct pathways/walkways
 - build footbridges across the watercourses
 - demarcate special areas for bird watching with benches around the area and educational posters at each sitting area.
 - placement of benches along the walkway/pathways
 - placement of waste bins along the walkways/pathways and in picnic areas
 - position recyclable waste stations at recreational areas especially close to the entrance/exit and the picnic area with braai facilities
 - install playing equipment for children = see-saw; swing; merry-go-round; jungle gym
 - create an area for playing games for both adults and children = life-size floor games such as chess; snake and ladders; hop-scotch
- Implement the proposed rehabilitation interventions within the WMU with the key rehabilitation focus being on the use of techniques such as soil bioengineering methods.
 - ✓ Construction of flood protection berms at areas close to the water resource
 - ✓ Construct and install Erosion Control fences (gabions, box gabions and gabion mattresses)
 - ✓ Sediment control - silt fence and gravel bags
 - ✓ Treating footpaths
 - ✓ Prevent overgrazing and animal trampling
 - ✓ Eradicate Invasive alien species control

The wetland rehabilitation interventions and the development of parks within the public open spaces present negative environmental impacts associated with rehabilitation and construction of the various stages of the intervention. These impacts to be encountered during the intervention however do not outweigh the positive benefits of the proposed rehabilitation programme including the socio-economic benefits to the surrounding community. The identified negative impacts are considered acceptable provided the recommended mitigation measures will be implemented and monitored as prescribed in the EMP. The environment will benefit in that the wetland health status will improve positively from its current status. The socio-economic benefits of the programme for the community include the following:

Environmental benefits

The wetland's health will improve through the removal of alien invasive plant species; clearing of waste and litter in the culverts; removal of silt in the culverts; installation of soil erosion gabion structures will improve the river banks; placement of gravel bags will help with reduction in sedimentation; preventing trampling by grazing livestock and control the harvesting rate of reeds by the local community will promote and increase with the indigenous vegetation that is a key habitat to flora and fauna. The re-vegetation of damaged and bare areas will help re-establish the indigenous plant and animal species within the wetland. Improved health status will promote return of certain species to the area.

Social benefits

The development of parks within the open spaces will enhance community social gathering spaces that are free and entertaining. The parks will also address the illegal dumping of waste behaviour prevalent within the community throughout the study area. The educational awareness campaigns that will encompass wetland protection and conservation; waste collection and management and general environmental health awareness will be aimed at the empowerment of communities. The critical element of training and skills transfer will also empower communities to participate with the monitoring of the programme especially after the decommissioning and handover to the community structures. The credits offered during the training received will build up on the skill level and opportunities

for further employment for community members involved in the programme. Linkages with the municipal department on wetland management and park maintenance could present further opportunities as well.

Economic benefits

Job creation opportunities are short-term and programme based. As soon as the programme is completed, only opportunities related to monitoring, maintenance and reporting will be available to a very few members of the community. A strategy for the continual engagement and involvement of the community members involved in the programme must be developed by the municipality and relevant community structures. In Zone 4, the proposed recreational activities associated with eco-tourism within the Fleurhof Dam area can boost the economic status of the area which is currently troubled by impacts such as acid mine pollution from the slimes dams and derelict mine dumps.

For alternative:

Alternative 1

Design Alternative:

Development of park and rehabilitation activities are the same as the proposal except the inclusion of special areas reserved for livestock grazing within the park in Zones 2 and Zone 3 to address overgrazing.

The issue of overgrazing by the livestock roaming freely within the wetland area has presented negative impacts to the wetland due to the trampling of the vegetation within the wetland. The proposed demarcation of special grazing areas within the parks to be developed within Zone 2 and Zone 3 presents both advantages and disadvantages. The advantage is the wetland will be protected from trampling and overgrazing by livestock through the fence of the park area. The special grazing area would need to have its own entrance and exit gate to be controlled at specific times. The disadvantage is that it requires a highly monitored programme and discipline to open and close the gate at times agreed upon. The controlling of the number of livestock to graze each time needs to be closely monitored so as to prevent overgrazing within the demarcated areas but to promote grass growth. The grazing capacity for each proposed area must be determined and strict rules need to be put in place for compliance and enforcement. A fenced off area with a separate entry and exit lockable gate must be created for the livestock and the herder to use; time slots allocated must be adhered to; rules must be followed as prescribed. A greenery fence is preferable so as to blend with the surrounding environment.

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.

South African wetlands are reported to be under heavy pressure from negative impacts resulting from human development activities. This requires interventions to ensure their conservation. As pointed out by several studies conducted that 655 of our wetland types are under threat (48% critically endangered, 12% endangered and 55 vulnerable) with only 11% are well protected leaving about 71% unprotected is more reason why their rehabilitation is vital. The proposed activity addresses the need to conserve wetlands through rehabilitation programmes within the Klip Middle Soweto. The wetland's health status is under dire pressure from the negative impacts resulting from human development and the planned new housing developments within the study area are only going to put more negative pressure on the wetland ecosystem. The proposed activity of wetland rehabilitation and the development of recreational spaces for the community complimented by the educational awareness and social benefits will ensure a positive transformation in the health status of the wetland and the community.

The environment will benefit in that the wetland health status will improve positively from its current status. Some of the socio-economic benefits of the programme for the community include the following:

Environmental benefits

The wetland's health will improve through the removal of alien invasive plant species; clearing of waste and litter in the culverts; removal of silt in the culverts; installation of soil erosion gabion structures will improve the river banks; placement of gravel bags will help with reduction in sedimentation; preventing trampling by grazing livestock and control the harvesting rate of reeds by the local community will promote and increase with the indigenous vegetation that is a key habitat to flora and fauna. The re-vegetation of damaged and bare areas will help re-establish the indigenous plant and animal species within the wetland. Improved health status will promote return of certain species to the area.

Social benefits

The development of parks within the open spaces will enhance community social gathering spaces that are free and entertaining. The parks will also address the illegal dumping of waste behaviour prevalent within the community throughout the study area. The educational awareness campaigns that will encompass wetland protection and conservation; waste collection and management and general environmental health awareness will be aimed at the empowerment of communities. The critical element of training and skills transfer will also empower communities to participate with the monitoring of the programme especially after the decommissioning and handover to the community structures. The credits offered during the training received will build up on the skill level and opportunities for further employment for community members involved in the programme. Linkages with the municipal department on wetland management and park maintenance could present further opportunities as well.

Economic benefits

Job creation opportunities are short-term and programme based. As soon as the programme is completed, only opportunities related to monitoring, maintenance and reporting will be available to a very few members of the community. A strategy for the continual engagement and involvement of the community members involved in the

programme must be developed by the municipality and relevant community structures. In Zone 4, the proposed recreational activities associated with eco-tourism within the Fleurhof Dam area can boost the economic status of the area which is currently troubled by impacts such as acid mine pollution from the slimes dams and derelict mine dumps.

7. SPATIAL DEVELOPMENT TOOLS

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

Spatial data in the form of the CoJ's Klipspruit, Soweto Rehabilitation and Development Master Plan were used to form basis of the location and extent of the Study area. The city's vision of the rehabilitation programme provided key spatial layout and design for the proposed activity. The Master Plan Maps included the Locality Map, the Concept and Zoning Map, Issues and Responses and Zoning Map and Land use which included potential areas for development of parks and priorities for wetland rehabilitation (**Appendix A**).

The issues and responses Map also assisted in guidance for the Specialist studies in investigating key impacts within the study area and recommendation of mitigation measures to minimise such impacts. The recommended mitigation measures are also provided in detail within the developed EMPr (**Appendix H**).

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).

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

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:

9. THE NEEDS AND DESIREBILITY OF THE PROPOSED DEVELOPMENT (as per notice 792 of 2012, or the updated version of this guideline)

The study area falls within a highly sensitive wetland area that is important for biodiversity and water filtration. it is surrounded by highly densely populated residential areas of Soweto within the Soweto Water Management unit with some of the key suburbs such as Dobsonville, Meadowlands, Molapo, Jabavu, Jabulani, Zondi, Orlando West and Mofolo.

Several studies have reported the undesirable health status of the wetlands of South Africa and according to the 2011 National Biodiversity Assessment 655 of our wetland types are under threat (48% critically endangered, 12% endangered and 55 vulnerable) with only 11% are well protected leaving about 71% unprotected is more reason why their rehabilitation is vital. The wetlands within the WMU are reported to be subjected to a number of negative impacts including illegal waste dumping, foot paths created within the wetland, mine dumps, slimes dams and tailings dams.

The recent drought crisis recently experienced in 2015, highlighted the urgent need for the conservation of water resources to ensure access to a sustainable and reliable water resource for South Africa. With the City committing to the conservation of its sustainable resources in its Growth Development Strategy (GDS) will ensure that the City is doing its part to prevent further impact's on our water resources and preventing similar water shortage crises that we are currently experiencing. In addition to this broader national challenge outlined above, the environmental aspects associated with the current high rate of development within the Johannesburg Metropolitan areas has contributed to

the pollution of vulnerable (WMU) within CoJ and further put pressure on the already stressed water infrastructure. The expansion of urban development has resulted in a loss of valuable riverine environment, with diversions and illegal weirs, encroachments, channelization and the construction of roads, bridges and culverts across rivers, resulting in their deterioration. In addition, the increased intensity of storm water runoff from urbanized catchments as well as increased pollutant loads is placing additional pressure on rivers which cannot always sustain such impacts. This leads to flooding, bacteriological pollution, chemical pollution, litter, exotic vegetation, bad visual impact, odour and sediment and obviously needs to be addressed.

According to the Engineering News dated 08 June 2016, The Water Resource Commission announced that if South African's do not start to curb their water consumption, the country will be faced a one-billion-plus cubic-metre deficit by 2030. Their CEO, Dhesigen Naidoo, also noted that South Africans currently consumed water well above global averages (235 l/d per person compared with the global average of 177 l/d per person).

The City of Johannesburg 2040 Growth and Development Strategy was developed as a long term inspirational strategy with the aim to respond to a multiple challenges and uncertain future faced by the city by strengthening the adaptive capacity of the city and its citizen. One of the key outcomes of the 2040 Growth Strategy for the City of Johannesburg is to lead in the establishment of sustainable and eco-efficient infrastructure solutions (e.g. housing, eco-mobility, energy, water, waste, sanitation and information and communications technology), to create a landscape that is liveable, environmentally resilient, sustainable, and supportive of low-carbon economy initiatives. In addressing environmental issues, the Strategy's theme on environment is based on resilience and sustainability as two key and fundamental concepts. The key themes include: environmental sustainability; the importance of building a resilient city in pursuit of a low-carbon economy; mitigating and reducing the potential impact of climate change; natural resource management in an ever changing urban landscape, and the role of citizens, in addressing one of the most significant risks of our time.

On building environmental sustainability, the city recognises the importance of the concept of sustainable development and also the critical importance of maintaining the ecological integrity of the city's natural resources in order for the city and its citizens to succeed in sustaining human and economic development. In order for the city to realise its vision for environmental sustainability, the involvement and cooperation of key stakeholders is essential. There is also a need to improve the management of the city's natural resources – and acknowledge the 'free services' they provide. In order to prevent their further decay, it is imperative that the City introduces environmental and health-related priorities into other policies and standards on water, air, waste, and – in respect of urban agriculture – soil. Developers should be encouraged, through regulations, to explore ecological sanitation methods. Other innovative mechanisms that could be used to prevent over-use of natural resources could include implementation of a tax on resource-use. In respect of water, input from the outreach process raised further views on how the quality, quantity and sustainability of water resources are fully dependent on good land management practices within the various catchment areas. The appropriate management of watercourses and reservoirs has a direct impact on both the nature of this natural asset, and other factors – such as the health of citizens. Appropriate management should encourage natural flow, which will help with storm water management and cleaning of the water – reducing the breeding grounds for mosquitoes and other pests.

This project will address some of these pressing issues facing the city, and as part of its support to the GDS goals, which advocate for management of water catchments and sources, namely, water conservation and preservation of the ecological reserve and the goal of reduced water pollution. WMUs play a role in the management of storm water as they act as receiver of storm water diverted through the storm water drains from the city streets to the water units. The wetlands within the WMU serves as a natural filtration system.

Specialists studies have recommended that rehabilitation of the wetlands within the study area is of crucial importance as the need to restore the functionality of the wetland will also enhance the water quality and biodiversity within the area. The proposed project also presents opportunities of job creation, capacity building, recreational activities through the development of new parks and renovation of existing ones such as Orlando West Park, Thokoza Park and Dorothy Nyembe Park which bring socio-economical benefits to the surrounding communities. The use of the wetland for religious purposes has also been observed within the area. The Klip -Middle Soweto WMU wetland unit has been regarded as critical based on the wetland health assessment conducted and thus its rehabilitation has been highly recommended.

By conduction these wetland rehabilitation interventions there will be improved water quality; free flowing drainage systems; reduced soil erosion of river banks and sedimentation of the river beds; improved waste collection and management systems including improved community environmental health awareness and social recreational environment in the area.

The importance of conserving and rehabilitating wetlands within the country is also shown by the support the National government has provided since 2001. As a response to the loss and degradation of the wetlands in South Africa, national government has since 2001/2002 financial year established a National Wetland rehabilitation Programme called Working for Wetlands (www.dea.org.za). The government has since 2001/2002 provided financial support towards wetland projects throughout South Africa. These include existing wetlands of national priority and also the proposed Ramsar Wetland for International importance. According to Wilgen et. al. 2012, the WfW Programme has spent R3.2 Billion between 1995 and 2008 on controlling the spread of Invasive Alien Species. The projects brought some socio-economic benefits to the communities engaged in terms of job creation and the environmental benefits were also evident from the soil erosion mitigation measures put in place. The rehabilitation process is said to include project activities such as gabion construction, removal of invasive alien species, surveying of flood irrigation furrows, construction and placing of grass bale gabions and levelling of drainage furrows. Within Gauteng some projects on wetland rehabilitation include Greater Jhb; Jukskei, Colbyn and Rietvlei. (Source: Working for Wetlands programme. www.dea.org.za)

It is reported that since 1996, the Working for Water Programme has been engaged in removing thirsty water invasive alien plants that pose a threat to the country's water security, agricultural productivity and biodiversity. Other private programmes that support government initiatives include the Mondli Wetland Project. The objective of the WfW are;

- wetland protection, wise use and rehabilitation
- skills and capacity development

- cooperative governance and partnerships
- knowledge sharing, communication, education and public awareness

The Department of Public Works' Expanded Public Works Programme (EPWP) has managed to also enhance wetland rehabilitation through labour-intensive process providing jobs from funds availed by departments responsible for biodiversity conservation and natural resource management.

10. THE PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED
(CONSIDER WHEN THE ACITIVTY IS EXPECTED TO BE CONCLUDED)

The City has budgeted several environmental projects including the rehabilitation programme over a number of financial years from 2016 till 2019, however it is envisaged that a rehabilitation programme of this magnitude would be completed within 5 years.
 The proposed activity will be implemented over a period of 5 years as the programme will be done in different stages within each Rehabilitation Zone.
 For example, this breakdown could be used to manage the programme and its budget over 5 years ensuring also the linkages with other similar environmental projects to ensure no duplication of effort takes place:

- Year 1: Zone 1 and Zone 2
- Year 2: Zone 2 and Zone 3
- Year 3: Zone 3
- Year 4: Zone 4
- Year 5: Project Decommissioning and Hand over process

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.
Appendix H

LISTS

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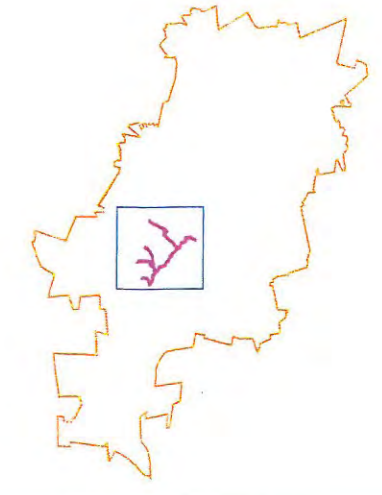
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APPENDIX A: SITE PLAN(S) – (MUST INCLUDE A SCALED LAYOUT PLAN OF THE PROPOSED ACTIVITIES OVERLAIN ON THE SITE SENSITIVITIES INDICATING AREAS TO BE AVOIDED INCLUDING BUFFERS)

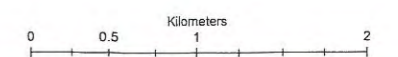
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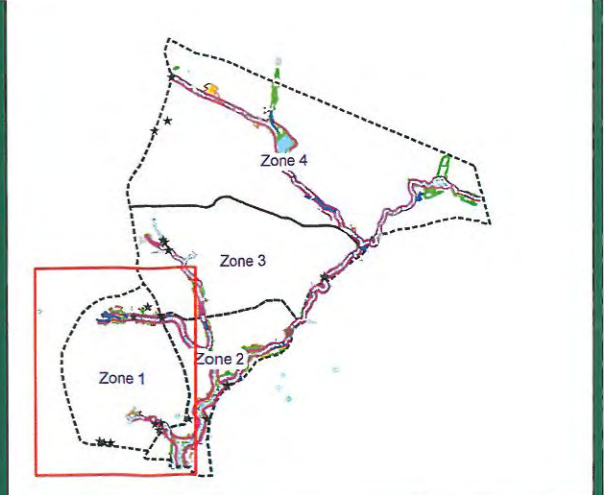
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 - 44-132_Power_Line
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 - Retaining_Wall_Lines
 - Streams_River_Lines
 - 1in100years_Floodline
 - Soweto_WM_Zones
 - Wards_2011
 - Wiers_Areas
 - Bridges_Areas
 - Culverts_Areas
 - Illegal_Dump_Poly_areas
- Intervention_Areas**
- Name**
- Erosion_Control_Fences
 - Gravel_Bags
 - Mulching
 - Wetlands
 - Water-Body_areas
 - City_of_Johannesburg_M

Projection: Transverse Mercator
 Datum: WGS 1984
 Linear Unit: Meters



KLIP MIDDLE SOWETO WMU

APPENDIX A.2



Legend

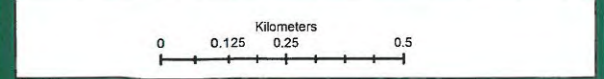
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Intervention_Areas

Name

- Erosion_Control_Fences
- Gravel_Bags
- Mulching

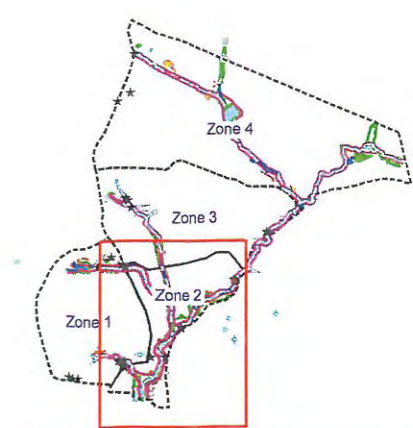
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KLIP MIDDLE SOWETO WMU



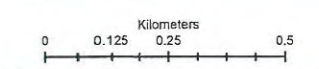
APPENDIX A.3



Legend

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 - ▨ Retaining_Wall_Lines
 - Streams_River_Lines
 - 1in100years_Floodline
 - ▭ Soweto_WM Zone_2
 - ▭ Wards_2011
 - ▨ Wiers_Areas
 - ▨ Bridges_Areas
 - ▨ Culverts_Areas
 - ▨ Illegal_Dump_Poly_areas
 - ▨ Wetlands
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- Intervention_Areas**
- Name**
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 - ▨ Gravel_Bags
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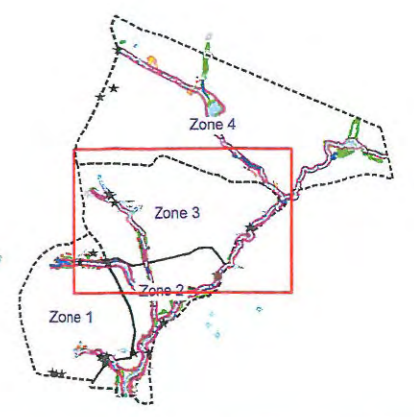
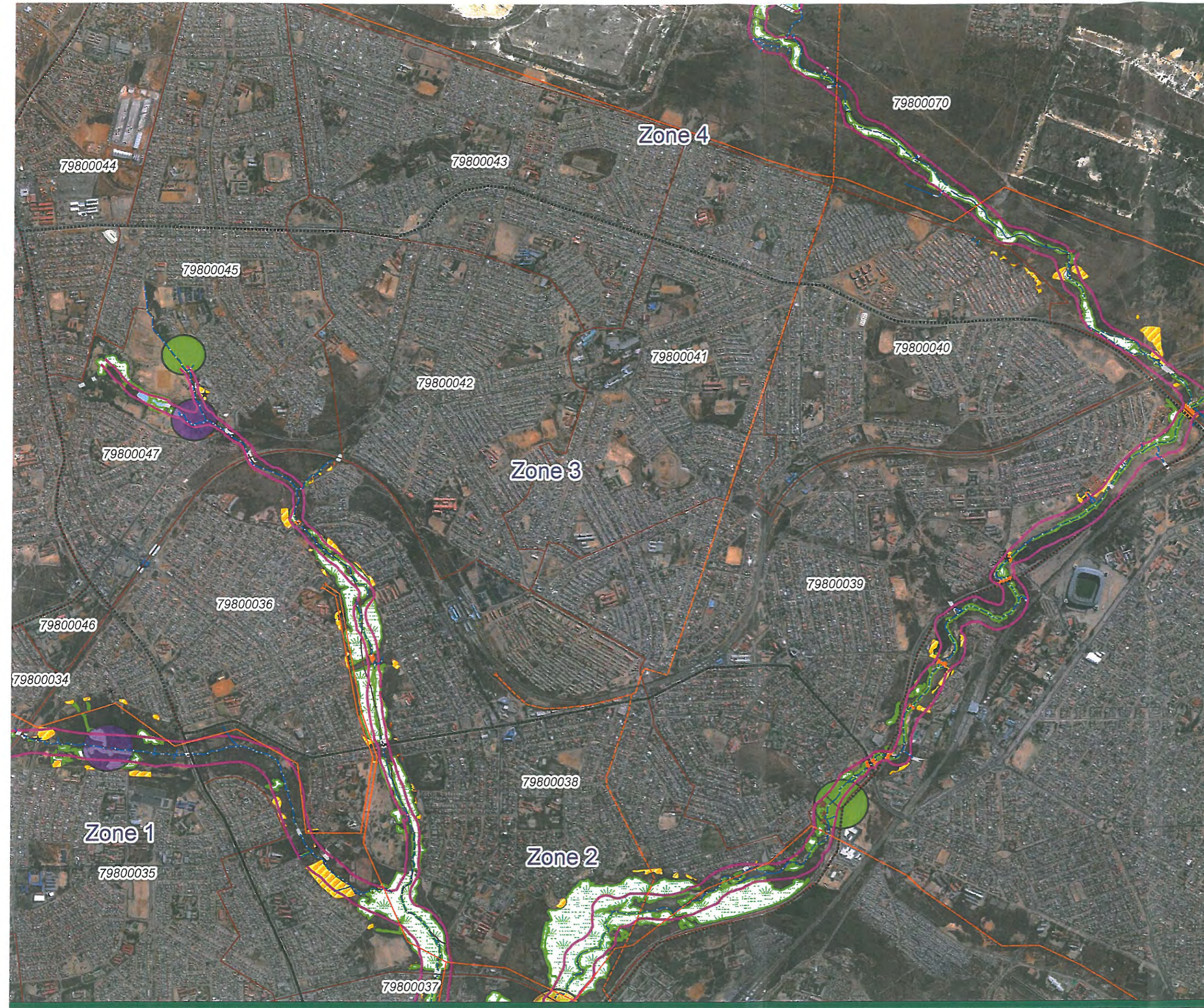
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KLIP MIDDLE SOWETO WMU

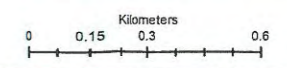


APPENDIX A.4



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 - Retaining_Wall_Lines
 - Streams_River_Lines
 - 1in100years_Floodline
 - Soweto_WM Zone_3
 - Wards_2011
 - Wiers_Areas
 - Bridges_Areas
 - Culverts_Areas
 - Illegal_Dump_Poly_areas
 - Wetlands
 - Water-Body_areas
- Intervention_Areas**
- Name**
- Erosion_Control_Fences
 - Gravel_Bags
 - Mulching

Projection: Transverse Mercator
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 Linear Unit: Meters



KLIP MIDDLE SOWETO WMU



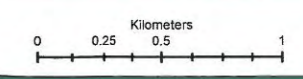
APPENDIX A.5



Legend

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 - 1in100years_Floodline
 - ▭ Soweto_WM Zone_4
 - ▭ Wards_2011
 - ▨ Wiers_Areas
 - ▨ Bridges_Areas
 - ▨ Culverts_Areas
 - ▨ Illegal_Dump_Poly_areas
 - ▨ Wetlands
 - ▨ Water-Body_areas
- Intervention_Areas**
- Name**
- ▨ Erosion_Control_Fences
 - ▨ Gravel_Bags
 - ▨ Mulching

Projection: Transverse Mercator
 Datum: WGS 1984
 Linear Unit: Meters



KLIP MIDDLE SOWETO WMU

APPENDIX B: PHOTOGRAPHS

All the positions of the pictures are also shown in the Surface layout plan in Appendix A. For easy reference, the photographic record presents the position of the impact observed labelled with a Waypoint number (WP) and the site coordinates of the exact location.

APPENDIX B.1 - PHOTOGRAPHIC RECORD OF OBSERVATIONS FROM ZONE 1 TO ZONE 3



Photo B.1-1. (WP 538: S26°11'7,96"; E27°52'32,3). Source of Acid Pollution in Zone 4



Photo B. 1-2. (WP 539: S26°14'27,3"; E27°52'45,8). Livestock grazing in Zone 2.



Photo B. 1-3. (WP 540: S26°14'15,29"; E27°52'35) Open dumping areas Zone 1



Photo B. 1-4. (WP 542: S26°14'29,06"; E27°51'53,9) Open Space areas proposed for the development of a park in Jabulani.



Photo B. 1-5. (S26°14'27,3"; E27°52'47,4) An example of the proposed park to be developed in Jabulani.



Photo B.1-6. An example of informal subsistence agriculture within the area.