PO Box 1898 • Sunninghill 2157
Tel: 0861 44 44 99
Fax: 0861 626 222
Email: info@envirolution.co.za
www.envirolution.co.za

AFFIRMATION BY ENVIRONMENTAL ASSESSMENT PRACTIONER – Basic Assessment: As required in terms of Appendix 1, subsection (r) of GN982

PROJECT TITLE: BASIC ASSESSMENT AND WATER USE LICENSE APPLICATION FOR THE PROPOSED DEVELOPMENT OF A BULK SEWER PIPELINE IN ZANDSPRUIT, GAUTENG PROVINCE.

DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

Environmental Assessment Practitioner (EAP):	Envirolution Consulting (Pty) Ltd		
Contact person:	Karthigesan Govender		
Postal address:	PO Box 1898, Sunninghill		
Postal code:	2157		
Telephone:	(0861) 444499	Cell:	083 419 8905
E-mail:	gesan@envirolution.co.za	Fax:	(086) 162 62 22
EAP Qualifications	Registered with the South African Council for Natural Scientific Professions (No: 400049/12) and the Environmental Assessment Practitioners Association of South Africa (No: 2019/317).		

I, ___**KARTHIGESAN GOVENDER**____, the appointed EAP confirm through this affirmation (as required in terms of Appendix 1 subsection (r) of GN982) that -

i) To the best of my knowledge the information provided in this report is factually correct;

ii) To the best of my knowledge all relevant project information which has been provided to stakeholders and interested and affected parties is correct.

iii) All comments and inputs received from stakeholders / interested and affected parties, prior to submission of the Basic Assessment Report have been included as part of the Basic Assessment Report and addressed where necessary.

iv) All responses provided to comments received from stakeholders and interested and affected parties are the unbiased opinion of the EAP and are based on factually correct information.

Signature of the environmental assessment practitioner:

Envirolution Consulting

Name of company:

19 January 2023

Date

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF EAP AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	12/12/20/ or 12/9/11/L
NEAS Reference Number:	DEA/EIA
Date Received:	

Application for integrated environmental authorisation and waste management licence in terms of the-

(1) National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014; and

(2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 921, 2013

PROJECT TITLE

BASIC ASSESSMENT AND WATER USE LICENSE APPLICATION FOR THE PROPOSED DEVELOPMENT OF A BULK SEWER PIPELINE IN ZANDSPRUIT, GAUTENG PROVINCE

Environmental Assessment Practitioner (EAP):	Envirolution Consulting (Pty) Ltd		
Contact person:	Karthigesan Govender		
Postal address:	P.O.Box 1898, Sunninghill		
Postal code:	2157	Cell:	[redacted]
Telephone:	0861 44 44 99	Fax:	0861 626 222
E-mail:	gesan@envirolution.co.za		
Professional affiliation(s) (if any)	Registered with the South African Council for Natural Scientific Professions (No: 400049/12) and the Environmental Assessment Practitioners Association of South Africa (No: 2019/317).		

Project Consultant:	N/A		
Contact person:	[redacted]		
Postal address:			
Postal code:		Cell:	
Telephone:		Fax:	
E-mail:			

4.2 The Environmental Assessment Practitioner

I, **KARTHIGESAN GOVENDER** declare that -

General declaration:

I act as the independent environmental practitioner in this application;
I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
I declare that there are no circumstances that may compromise my objectivity in performing such work;
I have expertise in conducting environmental impact assessments, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
I will comply with the Act, Regulations and all other applicable legislation;
I will take into account, to the extent possible, the matters listed in regulation **8** of the Regulations when preparing the application and any report relating to the application;
I have no, and will not engage in, conflicting interests in the undertaking of the activity;
I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
I will keep a register of all interested and affected parties that participated in a public participation process;
I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not;
all the particulars furnished by me in this form are true and correct;
will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Disclosure of Vested Interest (delete whichever is not applicable)

I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014;

~~I have a vested interest in the proposed activity proceeding, such vested interest being:~~

_____

_____

_____

_____

Signature of the environmental assessment practitioner:

Envirolution Consulting (Pty) Ltd

Name of company:

19 January 2023

Date:

CURRICULUM VITAE

Name:	**KARTHIGESAN GOVENDER**
Name of Firm:	ENVIROLUTION CONSULTING (PTY) LTD (2004 – Present)
Position:	Director and Principal EAP
Date of Birth:	12 April 1974
Nationality:	South African
Languages:	English, Afrikaans
ID Number	740412 5101 086

EDUCATIONAL QUALIFICATIONS

- B.Sc. – Wits University 1997
- B.Sc. (Honours) –Wits University 1999
- Certificate in Advanced Project Management – Damelin 2003

PROFESSIONAL REGISTRATION

- Environmental Assessment Practitioners Association of South Africa (**EAPASA**) Reg. No. 2019/317
- South African Council for Natural Scientific Professions (**SACNASP**) Reg. No. 400049/12

VOLUNTARY REGISTRATION

- International Association for Impact Assessment South Africa (IAIAsa)

Gesan has 20 years of experience in Environmental Management, he graduated from the University of the Witwatersrand, Johannesburg. After completing a BSc undergraduate degree, majoring in Zoology and Botany, he returned after a year of working to undertake a postgraduate BSc honours degree. This however was a multidisciplinary degree and included courses Environmental Science, Environmental Education and Natural Resource Management, with a Research topic in Wetland Delineation.

Gesan is currently a Director and the Principle EAP and Envirolution Consulting, Johannesburg with nineteen years of experience. Gesan has been exposed to a variety of projects and his involvement includes Environmental Impact Assessments, Environmental Compliance Monitoring, Screening Assessments, Section 24G Applications, Waste and Emissions permitting. Gesan's multidisciplinary exposure has ensured that his recommendations and planning for events are holistic and take into account all applicable role-players. He prescribes to the IAIAsa code of conduct.

KEY QUALIFICATIONS and RESPONSIBILITIES

Responsibilities

Write, review, plan and manage Environmental Projects.

Feasibility Studies (2000 to date):

- Conducted Environmental feasibility/screening studies for more than 40 proposed sites for housing development on behalf of Gauteng Department of Housing.
- Feasibility studies for various developments, including infrastructure projects for the Johannesburg Roads Agency (JRA), Johannesburg Water (JW) as well as various private developers and State-Owned entities.

Environmental Management Plans (EMPs) (2000 to date):

- Compiled EMPs associated with EIAs for housing developments as well as linear (power lines, pipelines and road infrastructure) construction developments and filling stations
- Developed procedures for conducting EMP related audits
- Conducted auditing of implemented EMPs

Environmental Audits (2000 to date):

- Chrome International South Africa- Tailings dam external audit
- Bakwena Platinum Corridor Concessionaire- Rustenberg bypass
- Various audits for construction projects including linear (power lines, pipelines and road infrastructure), residential, industrial and commercial projects.
- Road and Bridge External audits:
    - GaMorwa Bridge - 8 months - Joseph Ramalope 083 390 6574 (Civilchem)
    - Booysens Road – 12 months - Ivan Padayatchi 082 417 1416 (Thembakele Consulting)
    - Le Roux Road – 12 months – Kevern Ramborosa 082 600 8604 (Hlanganani)

Environmental Impact Assessment (2002 to date)

- Exemptions (various applications) - including installation of fuel storage tanks, township, commercial developments and infrastructure projects
- EIAs for proposed Cemeteries
- EIAs for commercial, industrial and housing developments
- EIAs for tourism related developments
- EIAs for filling station developments
- EIAs for the relocation of Sewer Plants
- EIAs for road and pipeline upgrades and development
- EIAs for proposed housing developments in Ekurhuleni Metropolitan Municipality on behalf of Gauteng Department of Housing – more than 20
- Scoping and EIA studies undertaken; project managed all the EIA related work for the Ekurhuleni Regional Professional Team
- EIAs for Eskom Transmission and Distribution and Generation
- Managed and participated in various environmental projects & programmes, in conjunction with external partners and stakeholders
- EIA for the Eskom Medupi Landfill
- EIAs Johannesburg Water
    - Sewer treatment Plants
    - Network construction and Upgrades

- EIAs for the Johannesburg Roads Agency
    - Road and Storm Water Infrastructure

        - Ballyclaire Road EIA – 6 months - Ivan Padayatchi 082 417 1416 (Thembakele Consulting)
        - Spencer Road EIA – 6 months – Andre Nel 082 492 2363 (Johannesburg Roads Agency)

- Outspan Road EIA – 6 months – Andre Nel 082 492 2363 (Johannesburg Roads Agency)

Section 24G Projects:

- S24G processes for infrastructure projects and industrial projects

Waste licence and AEL Projects:

- Waste and AEL applications industrial projects

Environmental Reporting and Policy Development (2000 to 2002):

- City of Johannesburg – Updating of the State of the Environment Report
- Conducted research on sustainable development issues affecting the city of Johannesburg
- Participated in the formulation of environmental strategy and policies, including Local Agenda 21
- Evaluated and commented on EIA's or development applications
- Reported on any environmental legislation insofar as it affected the city of Johannesburg
- Writing of Projects Terms of References for Consultants as well as managing consultants
- Task Team member of World Summit on Sustainable Development (WSSD) 2002 Preparatory Committee
- Task Team member of the Local Government Summit (LGS) coordinating committee for WSSD
- Provided input to the various WSSD sub-committees (WSSD Greening *etc*.)
- Coordinated and participated in the Local Agenda 21 activities of the City of Johannesburg
- Coordinated, participated and provided input into WSSD activities of the City of Johannesburg in conjunction with external stakeholders
- Stakeholder liaison and implementation of environmental policy and legislation
- Provided input into LIDP and Environmental Policy processes
- Assisted ICLEI with WSSD related activity and local government initiatives

Projects worked on and managed (2000 to 2004):

- Cities State of the Environment Report (CSOER) on the Internet – WSSD Project (Managed its updating)
- ICLEI's Cities for Climate Protection (CCP) Campaign – WSSD Project. (Coordinator for the City of Johannesburg
- Managed pilot projects focused on demand side management of energy resources: Energy efficient retrofitting of street lights as a showcase for WSSD, partnered with the International Institute for Energy Conservation (IIEC) – WSSD Project
- Managing Water for South African Cities with United Nations Center for Human settlements (UNCHS), involving Catchment Management of the Klipriver System and Upgrade
- The Strategy for Sustainable Development (SSD) for the City of Johannesburg WSSD Project
- Housing Projects with DANCED
- Green Procurement Project of the City of Johannesburg

EMPLOYMENT EXPERIENCE

ENVIROLUTION CONSULTING (PTY) LTD

Director and Principle Practitioner (1 September 2004 – present)

EIMS Group
Associate and Environmental Specialist for Environmental Impact Management Services (EIMS) and Director of Tswelopele Environmental (2002- 31 August 2004)

City of Johannesburg (Braamfontein)
Environmental Management Specialist
(2000-2002)

Standard Bank
212 Smith Street, Braamfontein
Position: Bank Teller (Nov. 1996 – May 1998)

Electronic Data Systems (EDS)
Commissioner Street, Johannesburg
Position: Customer Services Consultant (June 1998 – Jan. 1999 & Jan. 2000 – Aug. 2000)
Reason for leaving: Employed by City of Johannesburg

Wits University

- 1999: Teaching assistant for first year Zoology, Botany and Medical Students, and College of Science students at Wits University.
- 1999: Mapping and sampling vegetation at Nylsvlei Nature Reserve in the Northern Transvaal.
- 1999: Tutoring Zoology and Botany to first year and College of Science students at Wits University

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

At a congregation of the University

held on 13 April 2000

Karthigesan Govender

was admitted to the Degree of

Bachelor of Science with Honours

Botany

Dean, Faculty of Science

Vice-Chancellor and Principal

Registrar

EAPASA
Unit 19 Oxford Office Park
3 Bauhinia Street
Highveld Techno Park
Centurion
0157
Tel. (+27) 12 880 2154

Email: registrar@eapasa.org / Website: www.eapasa.org

Environmental Assessment Practitioners Association of South Africa
Advancing environmental assessment practice in South Africa

Mr Karthigesan Govender
52 Voster Ave Corner Glen Avenue
suite 1a and 2, vista place
glenanda
2091

Sent by email to: gesan@envirolution.co.za

Dear Mr Govender

Registered Environmental Assessment Practitioner: Number 2019/317
Karthigesan Govender : South African ID 7404125101086

The Environmental Assessment Practitioners Association of South Africa (EAPASA) herewith certifies that Karthigesan Govender is a Registered Environmental Assessment Practitioner (EAP) in accordance with the prescribed criteria of Regulation 15.(1) of the Section 24H Registration Authority Regulations (Regulation No. 849, Gazette No. 40154 of 22 July 2016, of the National Environmental Management Act (NEMA), Act No. 107 of 1998, as amended).

Your registration is duly authorised by EAPASA as the single Registration Authority for EAPs in South Africa (appointed as per Regulation No. 104, Gazette No. 41434 of 8 February 2018, in terms of section 24H(3)(a) of the NEMA). Your status as a Registered EAP is displayed in the 'EAP Register' - please find your name and contact email address at

https://registration.eapasa.org/registered-practitioners

Your registration is effective for a period of five years from 30 November 2019, and expires on 30 November 2024. The renewal of your registration in 2024 will be contingent on you having met the requirements of EAPASA's Continuing Professional Development (CPD) policy during each year of registration.

As a Registered EAP you are required to uphold the EAPASA Code of Ethical Conduct and Practice in your professional endeavours, towards the goal of quality assurance in environmental assessment practice.

Please accept my congratulations on your registration.

Best regards

RC Hill

Dr Richard Hill
Registrar
Date: 30 November 2019

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Karthigesan Govender
Registration number: 400049/12

is registered as a

Professional Natural Scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following field(s) of practice (Schedule I of the Act)

Environmental Science **15 February 2012**

15 February 2012

Pretoria

President

Executive Director

NIRVASHA RAJDEO

MSc Candidate·Cand.Sci. Nat·IAIAsa·ENVIRONMENTAL MANAGER ENVIROLUTION CONSULTINGcc
0788885334·nirvasha@yahoo.com·9410110040088·11/10/1994·SOUTH AFRICAN·DRIVERS CODE 8

SKILLS

- Familiar with Geographical Information Systems (Arc Map) and Remote Sensing (ERDAS Imagine and IDRISSI. Well acquainted with the Space Man program. Able to undertake desktop studies using various computer-based software (GIS ArcMap, Spaceman and Google Earth).
- Well trained in statistics program IBM SPSS and well acquainted in Microsoft office
- Standard laboratory practices
- Compiling EIAs, WULAA's, BID's and BAR's, auditing against Environmental Management Programmes (EMPr's), rehabilitation and site closure plans, compliance auditing and reporting, conducting Environmental Inductions for construction workforce, public participation, liaising and engaging with public and government departmental stakeholders on various projects, liaising with various personnel on and off site and attending monthly site meetings. ECO duties on various construction sites listed under projects worked on.
- Received online training on water sensitive urban design and planning (WSUDP). This training tackled issues in urban water management, and built resilience in the wake of public health crises and climate change in Africa.
- Trained Store associate with the Jump Start programme with Mr Price Group Limited. Trained on various life skills and work skills in a practical setting.
  - Operating P.O.S desk
  - Receiving, unpacking, capturing and shelving stock
  - Visual merchandising
  - Collating and sending off online orders
  - Customer relations

EXPERIENCE

- **ADMIN CLERK/SECRETARY,** THE RADIATOR PEOPLE, DECEMBER 2016 – APRIL 2019
  Duties - Responsible for general administrative tasks (answering emails/telephonic calls), capturing, filing and making out invoices. Learned in meticulous and efficient filing, data capture, overall organisational skills dealing with customers telephonically and in person.
  REFERENCE: NERESH RAJDEO (083) 254 0243

- **TRAINING ENVIRONMENTAL ASSISTANT,** AEON NEXUS, **JAN 2017 – APRIL 2017**
  Duties - Assisted in the compilation of wetland reports. Delineated and compiled health and risk assessments of wetlands. Wetland desktop screening, delineation and functional assessments, rehabilitation plans and offset plans. Experience is based on the Wet-Ecosystems and Wet-Eco-Services guidelines the Wetland Management Series by Kleynhans. Post degree report writing for business purposes was practiced.
  REFERENCE: SRINIVASAN PILLAY (Pri. Sc. Nat 115559) (083) 620 0199/Pillays2@ukzn.ac.za

- **STORE ASSOCIATE,** MR PRICE SPORT GATEWAY (151), NOVEMBER 2020 – 1 MONTH
  Employed as a casual (POS) after completing the two-week online and practical training as a store associate with the MR Price Jump Start Foundation. Responsible for various apparel departments, ensuring that merchandise is displayed and ready to be sold.
  REFERENCE: JESSICA WILLIAMS – STORE MANAGER (076) 901 9585/GATEWAY@MRPSPORT.COM

- **ENVIRONMENTAL OFFICER AND CONSULTANT,** ENAQ CONSULTING CC, APRIL 2019 - CURRENT
  Received mentoring in environmental legislation regulations 2010/2014 and environmental assessment processes through EnAq Consulting Cc from 06/02/2017 to 03/04/2017. Knowledgeable in the relevant South African Environmental legislation such as NEMA which includes the 2014 EIA Regulations, Listing Notices 1-3 GNR 324-327 to fulfil this role.
  REFERENCE: URVASSI HURBURAN Pri. Sc. Nat 400388/04, EAP: 2019/1754, (082) 875 3710/urvassi@enaq.co.za

CURRENTLY

- **ENVIRONMENTAL MANAGER,** ENVIROLUTION, SEPTEMBER 2021
  Duties – report compilation (basic assessments, water-use licenses, integrated waste water management plans, environmental impact assessments, environmental management programs - EMPrs) to acquire general authorisations (GA) and environmental authorisations (EA), lodging section 24G applications, compliance auditing against environmental authorisations and environmental management programs (EMPrs).
  REFERENCE: GESAN GOVENER – DIRECTOR (083) 419 8905/GESAN@ENVIROLUTION.CO.ZA

EDUCATION

- **NSC,** NORTHLANDS GIRLS HIGH SCHOOL, DECEMBER 2012
- **BSC (ENVIRONMENTAL SCIENCE),** UKZN, APRIL 2017
- **BSC HONOURS (ENVIRONMENTAL MONITORING AND MODELLING),** UNISA, FEBRUARY 2019**, Research Project - Identifying and quantifying the impacts of urbanisation in wetlands and estuaries in Kwadukuza using open source satellite imagery**
- **MSC (BY RESEARCH GEOGRAPHY AND ENVIRONMENTAL SCIENCE),** UKZN, CURRENT**, Research Project - Determining the ecological functioning of similar ecosystems with a focus on water purification and nutrient cycling within the Umgeni catchment**

PROJECTS WORKED ON:

ENAQ (cc)

- ACACIA ROAD, STORMWATER UPGRADE PROJECT, RAY NKONYENI LOCAL MUNICIPALITY (Environmental Control Officer)
  - Rehabilitation and conservation of coastal beach vegetation and sensitive trees as per Ezemvelo and EDTEA permits along Hibberdene coastline
  - Mitigation control measures for alien invasive species
  - Environmental compliance auditing against the EMPr
  - Attend monthly site meetings
  - Liaison with ecological specialist for further rehabilitation measures
- GAMALAKHE TO MARGATE BULK WATER PIPELINE, UGU DISTRICT MUNICIPALITY (Environmental Control Officer)
  - Rehabilitation and conservation of riverine ecosystem (Vungu River), sensitive grassland vegetation (Uplands and Seaslopes) and butterfly habitat as per Ezemvelo and EDTEA permits in Margate
  - Mitigation control measures for alien invasive species
  - Environmental compliance auditing against the EMPr
  - Attend monthly site meetings
- GOEDEHOEP HOUSING DEVELOPMENT ON ERF 1106 UTRECH, EMADLAGENI LOCAL MUNICIPALITY (Environmental Control Officer)
  - Mitigation control measures for alien invasive species
  - Environmental compliance auditing against the EMPr
  - Attend monthly site meetings
- THE AMAQADI CULTURAL VILLAGE, UMZINYATHI VALLEY, ETHEKWINI LOCAL MUNICIPALITY (Environmental Control Officer)
  - Mitigation control measures for alien invasive species
  - Environmental compliance auditing against the EMPr
- VIEWHAVEN HOUSING DEVELOPMENT ON REM OF LOT SKYES 15658, REM OF ERF 1358 FOREST HAVEN AND REM OF ERF 455 WOODVIEW, ETHEKWINI LOCAL MUNICIPALITY (Environmental Control Officer/Consultant)
  - Compiled BID
  - Public participation,
  - In the process of a 24G application for unlawful commencement of construction
  - WULA ongoing
  - Application for Environmental Authorization ongoing
  - Compiling of Basic Assessment ongoing
  - Environmental Impact report ongoing
- RECTIFICATION AND UPGRADE OF FAIRVIEW AND IXOPO TOWN SEWER SYSTEM (Environmental Control Officer and GIS technician)
  - Attend monthly site meetings
  - Rehabilitation and conservation of riverine and wetland ecosystems within Ixopo area
  - Mitigation control measures for alien invasive species
  - Environmental compliance auditing against the EMPr
  - Liaison with ecological specialist for further rehabilitation measures
- TAXI SHELTER UPGRADE, UMZUMBE LOCAL MUNICIPALITY (Environmental Control Officer)
  - Compiled screening report

- Mitigation control measures for alien invasive species
- Environmental compliance auditing against the EMPr

- TARRED ROAD, ST CHADS, UMNAMBITHI LOCAL MUNICIPALITY (Environmental Control Officer)
  - Compiled screening report
  - Attend monthly site meetings
  - Mitigation control measures for alien invasive species
  - Environmental compliance auditing against the EMPr
- UGU DISTRICT RURAL HOUSEHOLD SANITATION PROJECT (VENTILATED IMPROVED PIT LATRINES/VIP), HIBISCUS COAST LOCAL MUNICIPALITY (Environmental Control Officer)
  - Provides advice to the Project Engineer/Supervisor/Contractor when requested
  - Will be responsible for amendments to the EMPr, when required; and to ensure compliance with the environmental management plan
  - Discuss content of EMPr with Supervisor and Contractor
  - Conduct environmental induction on a monthly basis to workforce

ENVIROLUTION CONSULTING (ONGOING)

- PROPOSED JOHN DUBE EXTENSION 3 TOWNSHIP SITUATED ON PORTIONS OF REMAINING EXTENT 1 AND 83 OF THE FARM GROOTFONTEIN 165 IR, GAUTENG PROVINCE
  - Conduct Water-Use License process
  - Acquire Environmental Authorisation for proposed project
  - Acquire Water-Use License for proposed project
- PROPOSED FUEL RETAILING DEPOT IN BENONI, EKURHULENI METROPOLITAN MUNICIPALITY, GAUTENG PROVINCE
  - Conduct Basic Assessment process
  - Conduct Water-Use License process
  - Acquire Environmental Authorisation for proposed project
  - Acquire Water-Use License for proposed project
- THE PROPOSED DEVELOPMENT OF A FILLING STATION ON PORTION 0 OF ERF 32311, ERF 32312, ERF 32313, AND ERF 32317 KIMBERLEY WITHIN SOL PLAATJE LOCAL MUNICIPALITY, NORTHERN CAPE PROVINCE.
  - Conduct Basic Assessment process
  - Acquire Environmental Authorisation for proposed project
- PROPOSED SEWERAGE LINE FOR THE TOWNSHIP DEVELOPMENT IN WITPOORTJIE EXT 52, 61, 64 – 66, 68-69, 71, 74 – 77, CITY OF JOHANNESBURG METROPOLITAN MUNICIPALITY, GAUTENG PROVINCE.
  - Conduct Basic Assessment process
  - Conduct Water-Use License process
  - Acquire Environmental Authorisation for proposed project
  - Acquire Water-Use License for proposed project
- PROPOSED UPGRADE AND CONSTRUCTION OF COASTAL INFRASTRUCTURE, KING SABATA DALINDYEBO LOCAL MUNICIPALITY, COFFEE BAY AND HOLE IN THE WALL, EASTERN CAPE PROVINCE.
  - Conduct Basic Assessment process
  - Conduct Water-Use License process
  - Acquire Environmental Authorisation for proposed project
  - Acquire Water-Use License for proposed project
- WATER USE LICENSE APPLICATION FOR THE BABELEGI RESERVOIR UPGRADE
  - Conduct Water-Use License process
  - Acquire Water-Use License for proposed project

ENVIRONMENTAL CONTROL OFFICER PROJECTS

- CONSTRUCTION OF ROADS IN TSHEPISONG AUDIT, CITY OF JOHANNESBURG, GAUTENG PROVINCE
- ENVIRONMENTAL AUTHORISATION AND OPERATION EMPr COMPLIANCE AUDIT FOR REISA KATHU SOLAR FACILITY
- COOKHOUSE WIND FARM PROJECT ENVIRONMENTAL AUTHORISATION AND EMPr COMPLIANCE AUDIT
- HOPEFIELD WIND FARM PROJECT AND ASSOCIATED INFRASTRUCTURE ON A SITE - NEAR- HOPEFIELD, WESTERN CAPE PROVINCE. ENVIRONMENTAL AUTHORISATION AND EMPr COMPLIANCE AUDIT
- CONSTRUCTION OF STORMWATER INFRASTRUCTURE DEVELOPMENT AND UPGRADE IN NATURENA, IN THE CITY OF JOHANNESBURG, GAUTENG PROVINCE AUDIT

PROFESSIONAL ATTRIBUTES

- Aim to positively enhance my surrounding environments
- Able to efficiently identify client grievances/issues while resolving them objectively and professionally to ensure client satisfaction

- Easily adapt to changing working environments while yielding first-rate results
- Readily willing to aid others while learning on the job
- Able to work soundly in both autonomous and team environments
- Good sense of humour and always willing to be part of the team
- Enjoys networking and solidifying professional client relations
- Enthusiastic and passionate to constantly learn and apply myself
- Fast learner and always eager to prove my worth in a professional setting
- Boasts 6 years' worth of confident driving experience, **willing to relocate and travel**
- Knowledgeable in basic health and safety legislation and willing to augment expertise
- Able to cope under pressure and multitask in fast paced environments/time management and punctuality

PERSONAL

Professional, objective, reliable and perseverance are my most outstanding attributes. My beliefs include championing the protection and conservation of the natural environment since conserving the natural beauty of my country is imperative to our livelihoods. Constantly augmenting my expertise in the multifaceted field of environmental management/science, ecology, wetland studies, aquatic science, botany, GIS and Remote Sensing and air quality is my major career goal. I believe that learning does not stop at an academic level, it is an ongoing process that follows through ones working career. Hence, my interest in being part of the establishments environmental team stems from the desire to learn all that is offered by it and its dedicated workforce. Regardless of the field of work I strongly believe that given any opportunity I will be an asset to your corporation. Currently, I am a registered MSc candidate, candidate natural scientist (125582) and a member of IAIAsa (6718). My contemporary goal is to acquire Professional Natural Scientist and Environmental Assessment Practitioner titles. To demonstrate how committed I am to continuous professional development, I would like to publish scientific papers and become a member of various environmental and science related professional boards in future. I find solace in knowing that Thomas Edison allegedly found about a thousand ways not to make a light bulb but only needed one to make it work. If he could succeed, why can't I?

LINKEDIN PROFILE LINK

https://www.linkedin.com/in/nirvasha-rajdeo-b76768154/

UNIVERSITY OF KWAZULU-NATAL ™

INYUVESI YAKWAZULU-NATALI

This is to certify that

Nirvasha Rajdeo

was admitted this day
at a congregation of the University
to the degree of

Bachelor of Science

(Environmental Science)

having satisfied the conditions prescribed for the degree

AS van Jaarsveld
Vice - Chancellor

SS Mokoena
Registrar

O Mutanga
Acting Dean

213514880

05 April 2017

21982

UV PROTECTED

UNISA

UNIVERSITY OF SOUTH AFRICA

We certify that

NIRVASHA RAJDEO

having complied with the requirements of the Higher Education Act and the Institutional Statute, was admitted to the degree of

BACHELOR OF SCIENCE HONOURS

in Environmental Monitoring and Modelling

at a congregation of the University on 31 May 2019

Vice Chancellor

Executive Dean

University Registrar

19810353174682G05701

UN6689741SA

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Nirvasha Rajdeo

Registration Number: 125582

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following fields(s) of practice (Schedule 1 of the Act)

Environmental Science (Candidate Natural Scientist)

Effective **8 July 2020**

Expires **31 March 2022**

Botha

Chairperson

Chief Executive Officer

To verify this certificate scan this code

ANIL AGARWAL ENVIRONMENT TRAINING INSTITUTE
(A Unit of Centre for Science and Environment)

CERTIFICATE OF PARTICIPATION

Online Course on
Water Sensitive Urban Design and Planning

This is to certify that Mr/Ms **Nirvasha Rajdeo** has participated in the online course on **'Water Sensitive Urban Design and Planning'** jointly organised by the Centre for Science and Environment, India, Water Research Commission, South Africa and University of Cape Town (UCT), South Africa from **14th** to **22nd July, 2020.**

With best wishes.

Dr Suresh Kumar Rohilla
Senior Director & Academic Director
School of Water and Waste

Jay Bhagwan
Executive Manager
Water Research Commission, South Africa

Dr Kirsty Carden
Interim Director
Future Water Institute (UCT), South Africa

EnAq Consulting cc - Environmental, Civil, Water & Soils Consultants

CERTIFICATE OF ATTENDANCE

THIS IS TO CERTIFY THAT

NIRVASHA RAJDEO

Received mentoring on the following:

- Environmental Legislation; Environmental Regulations 2010/2014; Environmental Assessment Process

(PERIOD: once weekly from 06/02/2017 - 03/04/2017)
HELD AT ENAQ CONSULTING CC

Urvassi Hurburun Pr.Sci.Nat
Environmental Scientist

mrp foundation jumpstart

Certificate of Excellence

PRESENTED TO

Nirvasha Rajdeo

9410110040088

ID Number

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LIFE SKILLS COURSE

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A life skills workshop covering personal development and workplace etiquette to shape skills and attitude for the workplace.

Personal and Emotional Development, Self Esteem, Healing of the Past
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Basic HR Principles, Job Prep Skills, Customer Experience

Joe White
Catalyst Director

Karen Wells
Head of MRP Foundation

mrp foundation jumpstart

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PRESENTED TO

Nirvasha Rajdeo

9410110040088

for the successful completion of the

Jump Start

RETAIL FRONTLINE PROGRAMME

consisting of

Two weeks of life skills and holistic work experience to shape attitude and develop skills for positions in the retail environment

Karen Wells
Head of MRP Foundation

IAIAsa Secretariat
Tel +27(0)11 655 7183
Fax 086 662 9849

Address:
43 Birchwood Court, Montrose Street, Vorna Valley, Midrand, 1618

Postal address:
PO Box 11666, Vorna Valley, 1686
Email: operations@iaiasa.co.za
Website: www.iaiasa.co.za

IAIAsa Confirmation of Membership: 2021/2022
Nirvasha Rajdeo Membership Number: 6718

01 Jul 2021

TO WHOM IT MAY CONCERN

Miss Nirvasha Rajdeo, University of KwaZulu-Natal (IAIAsa membership Number 6718) is a paid-up Student Post Grad in good standing of International Association for Impact Assessment, South Africa and has been a member of IAIAsa since 19 Apr 2021.

Membership has been continous from 19 Apr 2021 to date.

This membership is valid from 01 Mar 2021 to 28 Feb 2022.

IAIAsa is a voluntary organisation and is not a statutory body regulating the profession. Its members are however expected to abide by the organisation's code of ethics which is available on our website.

IAIAsa is an Affiliate of IAIA which is an international body through a memorandum of understanding. IAIA is not responsible or liable for the actions or activities of the Affiliates. Membership of one does not imply membership of the other.

Any enquiries regarding this membership may be directed to the Secretariat at the above contact details.

Yours sincerely

Abulele Adams
President 2020/2021

Declaration of Independence

I, **Lizette Venter**, in my capacity as a specialist consultant, hereby declare that I -

- Act as an independent specialist and will perform the study in an objective manner free of influence and prejudice, even if the resultant findings are unfavourable to the applicant;
- Have the relevant expertise in conducting the report relevant to this application;
- Will comply with all regulations, Acts and other applicable guidelines that are applicable to the activity;
- Do not have any financial interest in the undertaking of the activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended;
- Do not have any conflicting interests in the preparation of this report;
- Undertake to disclose, to the competent authority, any material information that has or may have the potential to influence the decision taken with respect to the application by the competent authority or the objectivity of any report, plan or document required in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended;
- As a registered member of the South African Council for Natural Scientific Professions (SACNASP), will undertake my profession in accordance with the Code of Conduct of the Council, as well as any other societies to which I am a member; and
- Based on information provided to me by the project proponent, and in addition to information obtained during the course of this study, have presented the results and conclusion within the associated document to the best of my professional judgement.

This report has been prepared according to the requirements of Appendix 6 of the Environmental Impact Assessments Regulations, 2014 as amended; and GN 267, 2017 of the National Water Act, 1998 (Act No. 36 of 1998, as amended).

Lizette Venter (*Pri.Sci.Nat.*)
Wetland specialist
SACNASP Reg. No. 013713

Macfarlane D.M., Bredin I.P., Adams J.B., Zungu M.M., Bate G.C., and Dickens C.W.S. (2014) Preliminary Guideline for the Determination of Buffer Zones for Rivers, Wetlands and Estuaries. Water Research Commission report TT610/14.

Mucina L., & Rutherford M. C. (2006). Vegetation Map of South Africa, Lesotho and Swaziland, 1:1 000 000 scale sheet maps. South African National Biodiversity Institute., Pretoria.

7. CV OF SPECIALIST

Lizette Venter

South African Wetland Society
Pri. Sci. Nat. (Reg. No. 013713)

Work History

BOKAMOSO LANDSCAPE ARCHITECTS AND ENVIRONMENTAL CONSULTANTS CC
- Environmental Consultant and Wetland Specialist
  - Wetland delineation and functional assessments
  - Environmental Impact Assessments
  - Environmental Compliance

DELTERRA CONSULTING – Environmental Consultant
- Wetland delineation
- Ecological/ risk and impact assessments
- Desktop analysis
- Environmental Compliance

WETREST – Research as part of MSc in Aquatic Health
- "A Holocene Wetland: Hydrological Response to Rehabilitation at Colbyn Valley Wetland, Pretoria, Gauteng"
- Weekly groundwater level and pressure monitoring
- Isotope analysis
- Water quality monitoring
- Vegetation growth mapping

Education

MSC IN AQUATIC HEALTH – University of Johannesburg
BSC HONS IN ENVIRONMENTAL MANAGEMENT (CUM LAUDE) – UNISA
BSC AGRICULTURE – University of the Free State

Projects

Wetland delineation, PES/EIS, functional assessment, Impacts and Mitigation, VEGRAI, QHI, Risk Assessments

Riverwalk Electrical

Lanseria x66 Mixed-use Development, Johannesburg

Lanseria x65 Filling Station, Johannesburg

TUT Ga-Rankuwa Expansion, Ga-Rankuwa, Gauteng. (in progress)

Waterfall Ridge Mixed-use Development, Johannesburg. (in progress)

Glen Vista Residential Development, Gauteng

Nkosi City Mixed-Use Development, Mpumalanga

Slovo Park/ Nancefield Residential Development, Gauteng

Kudube Unit 9 Sewer Outfall, Gauteng

Mooibosch Resort Development, Gauteng

Hartebeeshoek Mixed-use Development, Gauteng

Wheatlands Solar Farm, Gauteng

Thula Mall, Bushbuckridge, Mpumalanga

Mthatha – Bedford City Mixed-use Development, Mthatha, Eastern Cape

Expansion of Transnet Railway Loops at Thabazimbi, Ferrogate and Northam, Limpopo

Riverwalk Electrical Line, Pretoria

Ormonde Residential Development, Johannesburg

Coal mining rights application for Berenice, Limpopo Province.

Ekhuthuleni Roads and Stormwater Upgrades

Proposed Housing Development on the Farm Middbuilt Position 11 and 81 and Eloff Er 675, Delmas.

Kagisa and Environs Integrated Development and Housing Project, West Rand, Gauteng.

Witpoortjie Residential Development, Krugersdorp, Gauteng

Moretele Distribution Powerlines and Substations, Pretoria, Gauteng

Panfontein Access Road for Rand Water in Midvaal Local Municipality, Gauteng

Hawerklip Coal Siding at Brazen Algar, Delmas, Mpumalanga

Eskom Westgate - Ntshona Powerline, Gauteng Province

Ecological Importance and Sensitivity, and Present Ecological Status assessment for water use application for Soweto, Gauteng Province

Diepsloot East Powerline and Substation, Gauteng Province

Gem Valley Residential Development, Pretoria North

Amberfield Residential Development, Centurion

Wetland Rehabilitation Plans

Kameeldrift Feedlot, Cullinan

Thula Mall, Bushbuckridge, Mpumalanga

Waterfall 5IR Wetland Rehabilitation and Action Plan, Gauteng (in progress)

Eagle's Creek Flight Academy, Centurion

Risk Assessments

Hazeldean Bouleavrd Rd amended WUL, Pretoria

Kudube Unit 9 Sewer Pump Station, Shoshanguve

Thema Babelegi Sewer Pump Station and Pipeline, Shoshanguve

Kikuyu/Waterfall Fields Electrical Lines, Johannesburg

Kikuyu/ Waterfall Fields Water Pipelines, Johannesburg

Parkdene x7 Mixed-use Development services and road upgrades, Johannesburg

Reiger Park x19 Mixed-use Development services and road upgrades, Johannesburg

Slovo Park/ Nancefield Informal Settlement, Johannesburg

Waterfall Fields Electrical Line, Johannesburg

Winterveld x5 Residential Development Sewer, Soshanguwe

Winterveld North Sewer Outfall, Soshanguve

Winterveld South Sewer Outfall, Soshanguve

Riverwalk Electrical Line, Pretoria

Thula Mall, Bushbuckridge, Mpumalanga

Leeuwpoort South Mixed-use Development, Johannesburg

Kudube Sewer Outfall and Pump Stations, Shoshanguve

Environmental Authorisations (EIA, BAR, Amendments)

DK Pharmaceutical Building, Lesotho - Scoping and EMPr

Peach Tree x21&22 Industrial Township, Centurion – BAR, Pt1 amendment

Peach Tree x23 Industrial Township, Centurion – Pt1 amendment

Peach Tree x24 Industrial Township, Centurion– Pt1 amendment

Peach Tree x25 Industrial Township, Centurion - BAR

Varsity College Expansion, Pretoria – Ecological Opinion

Fairlands Interchange, Johannesburg – EIA

PWV17 Freeway, Pretoria – EIA

Hazeldean Boulevard Road – EIA

Lanseria x 66 Mixed-use Development – BAR

La Montagne Reservoirs, Pretoria – BAR

PWV18 Route Determination – Environmental Scan

Welgedacht Filling Station – BAR

Cavalier Abattoir Expansions – Amendment, BAR

Zandspruit X93-96 Residential - BAR

Zandspruit X97&103 Residential - BAR

Water Use Licences

Hebron Mall WWTW

Malekane Mall

Cavalier Abattoir

Peach Tree X25 WWTW

Peach Tree X21-25 Electrical Line

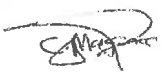
Peach Tree X25 Stormwater

SPECIALIST DECLARATION

I, **Nkoliso Magona**, (SACNASP Cand.Sci. Nat Reg. No. 123830) in my capacity as a specialist consultant, hereby declare that I -

- Act as an independent specialist and will perform the study in an objective manner, free of influence and prejudice, even if the resultant findings are unfavourable to the Applicant;
- Have the relevant expertise in conducting the report relevant to this Application;
- Will comply with all regulations, acts and other applicable guidelines that are applicable to the activity;
- Do not have any financial interest in the undertaking of the activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended;
- Do not have any conflicting interests in the preparation of this report;
- Undertake to disclose, to the Competent Authority, any material information that has or may have the potential to influence the decision taken with respect to the Application by the Competent Authority or the objectivity of any report, plan or document required in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended;
- Based on information provided to me by the project proponent, and in addition to information obtained during the course of this study, have presented the results and conclusion within the associated document to the best of my professional judgment.

The approach has taken cognisance of the recently published Government Notice 320 in terms of NEMA dated 30 October 2020: "Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation".



Nkoliso Magona

Ecologist

Declaration of Independence

I, Avhafarei Phamphe, declare that I –

- act as the independent external peer-review specialist;
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations 2014;
- will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- there are no circumstances that may compromise my objectivity in performing such work;
- have expertise in conducting the specialist report relevant to this application, including knowledge of the National Environmental Management Act, 1998 (Act No. 107 of 1998), regulations and any guidelines that have relevance to the proposed activity;
- will comply with the Act, regulations and all other applicable legislation;
- have no, and will not engage in, conflicting interests in the undertaking of the activity;
- undertake that the report adheres to Appendix 6 of GN No. R 982 of 4 December 2014 (as amended), and
- will provide the Competent Authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not.

Avhafarei Phamphe:

- Holds a M. Sc in Botany from the University of the Pretoria;
- Is registered with South African Council for Natural Scientific Professions (SACNASP) as a Professional Natural Scientist (Pr.Sci.Nat) Ecological Science, (Registration No.: 400349/12), with expertise in floral and faunal ecology;
- Has been actively involved in the environmental consultancy field for over 18 years;
- Is a Professional Member of South African Institute of Ecologists and Environmental Scientists (SAEES) and
- Is a member of the South African Association of Botanists (SAAB).

Avhafarei Phamphe

Name of Specialist

Mboneni Ecological Services (Pty) Ltd

Name of Company

03 July 2022

Date

Signature

Annexure C: CV of Specialist

NKOLISO MAGONA

nkoliso@bokamoso.net

012 346 3810

Work history

BOKAMOSO ENVIRONMENTAL CONSULTANTS - Ecologist and ECO

- Conduct Flora and Fauna Assessments
- Compiling Flora and Fauna Reports
- Serving as Environmental Control Officer

NATIONAL RESEARCH FOUNDATION - Research intern

- Manage Biosecurity Enforcement for Ants introduced to SA
- Compile national status of Ants in SA
- Conduct site visits

SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE – Research intern

- Provide biodiversity input into the appeal process related to Environmental Authorizations
- Conduct site visits
- Compile site visit reports and incorporate the site visit findings into the recommendations

NATIONAL RESEARCH FOUNDATION - Laboratory Technician

- Preparing specimens and samples; constructing
- Maintaining and operating standard laboratory equipment
- Ensuring the laboratory is well-stocked and resourced
- Contribute to the development and implementation of Capacity Development Programme

Education

MSc IN BOTANY – Stellenbosch University

BSc HONS IN ZOOLOGY – Walter Sisulu University

BSc BIOLOGICAL SCIENCES – Walter Sisulu University

Projects

Fauna and Flora survey

- Cavalier New Parking Area and Solar Panels on Portion 83 of the farm Tweefontein, City of Tshwane
- Ecological Opinion for the Proposed Lotus Gardens X9, situated on Erven 7547 and 7548, City of Tshwane
- Ecological Scan for the Proposed Hidden Hills Golf Estate on Various Portions of the Farm Nooitgedacht 534 JQ, Lanseria.
- Flora and Fauna survey for the Proposed Hidden Hills Golf Estate on Various Portions of the Farm Nooitgedacht 534 JQ, Lanseria.
- Garsfontein Filling station on ERF 1657 Garsfontein X8, City of Tshwane
- Groblersdal filling station Portion 1 of the farm Loskop Suid 53 JS. Ecological potential opinion
- Hazyview filling station Portion 204 of the farm De Rust 12JU, Remainder of Portion 109 of the Farm De Rust 12JU
- Hazyview Phase 2 Mall expansion Portion 204 of the farm De Rust 12JU, Remainder of Portion 109 of the Farm De Rust 12JU
- Hazyview Residential Development Portion 204 of the farm De Rust 12JU, Remainder of Portion 109 of the Farm De Rust 12JU
- Majesty Oil Mills development ecological opinion, Remaining Extent of Portion 88 (a portion of Portion 1) of the Farm Luipaardsvlei 246 IQ and Erven 125, 126, 127, 128, 129 and 131
- Malekane Mall on part of Portion 7 of the Farm Steelpoortdrift 365 KT, Limpopo
- Mnandi Filling station on Holding 140, Mnandi Agricultural Holdings, Tshwane, Gauteng Province.
- Mooikloof Retail Park for the development on part of portion 54 of the farm Rietfontein 375 JR, City of Tshwane
- Munyaka Crystal lagoons for the approval of the x2 lagoons to be implemented in Midrand, South Africa
- N4 and Solomon Mahlangu Drive (M10) roads and storm water infrastructure construction and upgrading from the N4 interchange to the R104
- New proposed Hatchery farm on various portions of the farm Hartebeesfontein 445 JQ
- Onderstepoort Wholesale Diesel storage area on a portion of portion 99 of the farm De Onderstepoort 300-JR, Gauteng Province
- Paledi mall expansion Mankweng, Polokwane, 0727
- Peach Tree x20 Bulk Water Pipeline situated on portions 72 & 73, Remainder of Portion 332 of the Farm Knoppieslaagte 385-JR
- Peach Tree x21-25 Electrical situated on portions 20, 815 and the Remainder of Portion 332 of the Farm Knopjeslaagte 385 JR

- Peach Tree x21-25 New alignment Electrical situated on portions 20, 815 and the Remainder of Portion 332 of the Farm Knopjeslaagte 385 JR
- Proposed Development on Portions 287 to 295 of the Farm Mooiplaats 367 JR, City of Tshwane
- Environmental scan for the proposed Filling Station on Holding 171 of Raslouw Agricultural Holdings, Gauteng Province
- Rietvlei filing station situated on portion 1 of the Farm Witkoppies 393-JR
- Rietvlei Waste Water Treatment Works situated on portion 1 of the Farm Witkoppies 393-JR
- Secunda X13 filling station on Portion 5 of Erf 84
- Standerton X10 Mixed Used Development on Portion of the Remainder of Portion 2, a Portion of the Remainder of Portion 7 and Portion 4 of the Farm Grootverlangen 409 IS
- Standerton X10 Residential Development on part of the Remainder of Portion 7 of the Farm Grootverlangen 409 IS. Mpumalanga
- Sunderland Ridge Portion 87 industrial 1 Township on Remainder of Portion 29 of the Farm Mooiplaats 355 JR
- Thulamahashe B Sewer Line on Erf 63 in the Township Thulamahashe B
- Waterfall Estate situated on the farm Waterfall 5IR, Midrand, South Africa
- Proposed Residential 1 Township Development on Portion 483 of the Farm Hartebeesthoek 303JR, Pretoria
- Environmental Application Process Associated with the Proposed Poultry Farm to be situated on Portion 17 of the farm Schietfontein 437 JQ, North West Province
- Fauna and Flora Survey for the proposed Malekane Bridge on Road D2219 and Expansion of a Portion of Roads D2219, D1392 and the R555 in Steelpoort, Limpopo Province
- Ridges Studies for the proposed Residential 1 Township Development on Portion 483 of the Farm Hartebeesthoek 303JR, Pretoria

4. Curriculum vitae

Johan Abraham van Schalkwyk

Personal particulars

Date of birth:	14 April 1952
Identity number:	520414 5099 08 4
Marital status:	Married; one daughter
Nationality:	South African

Current address: home

62 Coetzer Ave, Monument Park, Pretoria, 0181
Mobile: 076 790 6777; E-mail: jvschalkwyk@mweb.co.za

Qualifications

1995 DLitt et Phil (Anthropology), University of South Africa
1985 MA (Anthropology), University of Pretoria
1981 BA (Hons), Anthropology, University of Pretoria
1979 Post Graduate Diploma in Museology, University of Pretoria
1978 BA (Hons), Archaeology, University of Pretoria
1976 BA, University of Pretoria

Non-academic qualifications

12th HSRC-School in Research Methodology - July 1990
Dept. of Education and Training Management Course - June 1992
Social Assessment Professional Development Course - 1994
Integrated Environmental Management Course, UCT - 1994

Professional experience

Private Practice
2017 - current: Professional Heritage Consultant

National Museum of Cultural History
1992 - 2017: Senior researcher: Head of Department of Research. Manage an average of seven researchers in this department and supervise them in their research projects. Did various projects relating to Anthropology and Archaeology in Limpopo Province, Mpumalanga, North West Province and Gauteng. Headed the Museum's Section for Heritage Impact Assessments.
1978 - 1991: Curator of the Anthropological Department of the Museum. Carried out extensive fieldwork in both anthropology and archaeology

Department of Archaeology, University of Pretoria
1976 - 1977: Assistant researcher responsible for excavations at various sites in Limpopo Province and Mpumalanga.

Awards and grants

1. Hanisch Book Prize for the best final year Archaeology student, University of Pretoria - 1976.
2. Special merit award, National Cultural History Museum - 1986.
3. Special merit award, National Cultural History Museum - 1991.
4. Grant by the Department of Arts, Culture, Science and Technology, to visit the various African countries to study museums, sites and cultural programmes - 1993.
5. Grant by the USA National Parks Service, to visit the United States of America to study museums, sites, tourism development, cultural programmes and impact assessment programmes - 1998.
6. Grant by the USA embassy, Pretoria, under the Bi-national Commission Exchange Support Fund, to visit cultural institutions in the USA and to attend a conference in Charleston - 2000.
7. Grant by the National Research Foundation to develop a model for community-based tourism - 2001.

8. Grant by the National Research Foundation to develop a model for community-based tourism - 2013. In association with RARI, Wits University.

Publications
Published more than 70 papers, mostly in scientifically accredited journals, but also as chapters in books.

Conference Contributions
Regularly presented papers at conferences, locally as well as internationally, on various research topics, ranging in scope from archaeology, anthropological, historical, cultural historical and tourism development.

Heritage Impact Assessments
Since 1992, I have done more than 2000 Phase 1 and Phase 2 impact assessments (archaeological, anthropological, historical and social) for various government departments and developers. Projects include environmental management frameworks, roads, pipeline-, and power line developments, dams, mining, water purification works, historical landscapes, refuse dumps and urban developments.

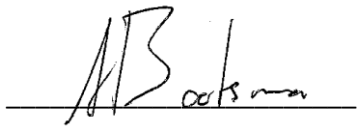
Latest publications
Van Schalkwyk, J.A. 2020. A cognitive approach to ordering of the world: some case studies from the Sotho- and Tswana-speaking people of South Africa. In Whitley, D.S., Loubser, J.H.N. & Whitelaw, G. (eds.) *Cognitive Archaeology. Mind, Ethnography, and the Past in South African and Beyond*. London: Routledge. Pp. 184-200.

Namono, C. & Van Schalkwyk, J.A. 2020. Appropriating colonial dress in the rock art of the Makgabeng plateau, South Africa. In Wingfield, C., Giblin, J. & King, R. (eds) *The pasts and presence of art in South Africa: Technologies, Ontologies and Agents*. University of Cambridge: McDonald Institute for Archaeological Research. Pp. 51-62.

Declaration of Independence

I, **Antoinette Bootsma**, in my capacity as a specialist consultant, hereby declare that I -

- Act as an independent consultant;
- Do not have any financial interest in the undertaking of the activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act 107 of 1998);
- Undertake to disclose, to the competent authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the National Environmental Management Act, 1998 (Act 107 of 1998);
- As a registered member of the South African Council for Natural Scientific Professions, will undertake my profession in accordance with the Code of Conduct of the Council, as well as any other societies to which I am a member; and
- Based on information provided to me by the project proponent, and in addition to information obtained during the course of this study, have presented the results and conclusion within the associated document to the best of my professional judgement.



2022.09.27

Antoinette Bootsma (PrSciNat) Date

Ecologist/Botanist

SACNASP Reg. No. 400222-09

CURRICULUM VITAE (CV) OF ANTOINETTE BOOTSMA 2022

Director and Senior Wetland Specialist at Limosella Consulting since 2009.

16 Years experience as an ecologist

Professional Affiliations:

Professional Natural Scientist (SACNASP) # 400222-09 Botany and Ecology

South African Wetland Society # NA6RY2FP

Grassland Society of South Africa

Highest Qualification - M.SC (Environmental Science), University of South Africa, 2017. *Awarded with distinction*. Project Title: Natural mechanisms of erosion prevention and stabilization in a Marakele peatland; implications for conservation management

Latest Publication - A.A. Boostma, S. Elshehawi, A.P. Grootjans, P.L Grundling, S. Khosa, M. Butler, L. Brown, P. Schot. 2019. Anthropogenic disturbances of natural ecohydrological processes in the Matlabas mountain mire, South Africa. South African Journal of Science Volume 115| Number 5/6, May/June 2019, P1 to 8

- **Summary of relevant skills:**
- Management of projects in terms of specialist input, including quotations, planning, technical review, submission of reports and invoicing;
- Fine scale wetland delineations and functional assessments;
- Strategic wetland assessments and open space management and planning;
- General Rehabilitation, Monitoring and Mitigation assessments.
- Implementation of wetland assessment tools including the DWS (2016) Risk Assessment, Present Ecological Status (PES) Macfarlane et al, (2007), Ecological Importance and Sensitivity (EIS) (DWAF, 1999), Recommended Ecological Category (REC) Rountree et al (2013), Riparian Vegetation Response Assessment Index (VEGRAI) (Kleynhans et al, 2007) and QHI (Quick Habitat Integrity)

Short list of projects to demonstrate experience:

- More than 90 external peer reviews as part of mentorship programs for companies including Galago Environmental Consultants, Lidwala Consulting Engineers, Bokamoso Environmental Consultants, Gibb, 2009 ongoing
- Wetland specialist input into the City of Tshwane Open Space Framework, 2019
- Wetland specialist input into the North West Environmental Outlook, 2018
- Wetland specialist input into the Gauteng Environmental Outlook, 2017
- Wetland specialist input into the Open Space Management Framework for Kyalami and Ruimsig, City of Johannesburg, 2016
- Kangra Maquasa East and Maquasa West and Nooitgesien Mine, Mpumalanga Province: Rehabilitation and Monitoring Assessment. June 2018
- Mbuyelo Coal Welstand Reserve Amendment: Wetland assessment. June 2017
- Proposed mining right to mine on portion of the remaining extent of the farm Dingwell No. 276 JT, Barberton Magisterial District, in Mpumalanga Province: Wetland Delineation and Assessment. January 2017
- Fine scale wetland specialist input including General Rehabilitation Plan into the ESKOM Bravo Integration Project 3, 4, 5 and Kyalami – Midrand Strengthening, December 2017
- Fine scale wetland specialist input including General Rehabilitation Plan into 3 Eskom Projects to lay underground power cables in Gauteng; Craighall to Sandton, Croyden to Germiston and Randburg, November 2017
- Dama Colliery, Near Utrecht, KwaZulu-Natal Province: Preliminary Wetland Delineation& Functional Assessment Report. February 2015
- Harmony Gold Mining co Ltd's Evander Operations Property Area, Mpumalanga Province: Wetland Delineation and Functional Assessment. February 2011

SCREENING REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED SITE ENVIRONMENTAL SENSITIVITY

EIA Reference number: GAUT 002/22-23/E3313

Project name: Zandspruit Bulk Sewer Pipeline

Project title: The Proposed Development of a Bulk Sewer Pipeline in Zandspruit, Gauteng Province.

Date screening report generated: 22/07/2022 14:45:16

Applicant: CityDev (Pty) Ltd

Compiler: Envirolution Consulting (Pty) Ltd

Compiler signature:

.....

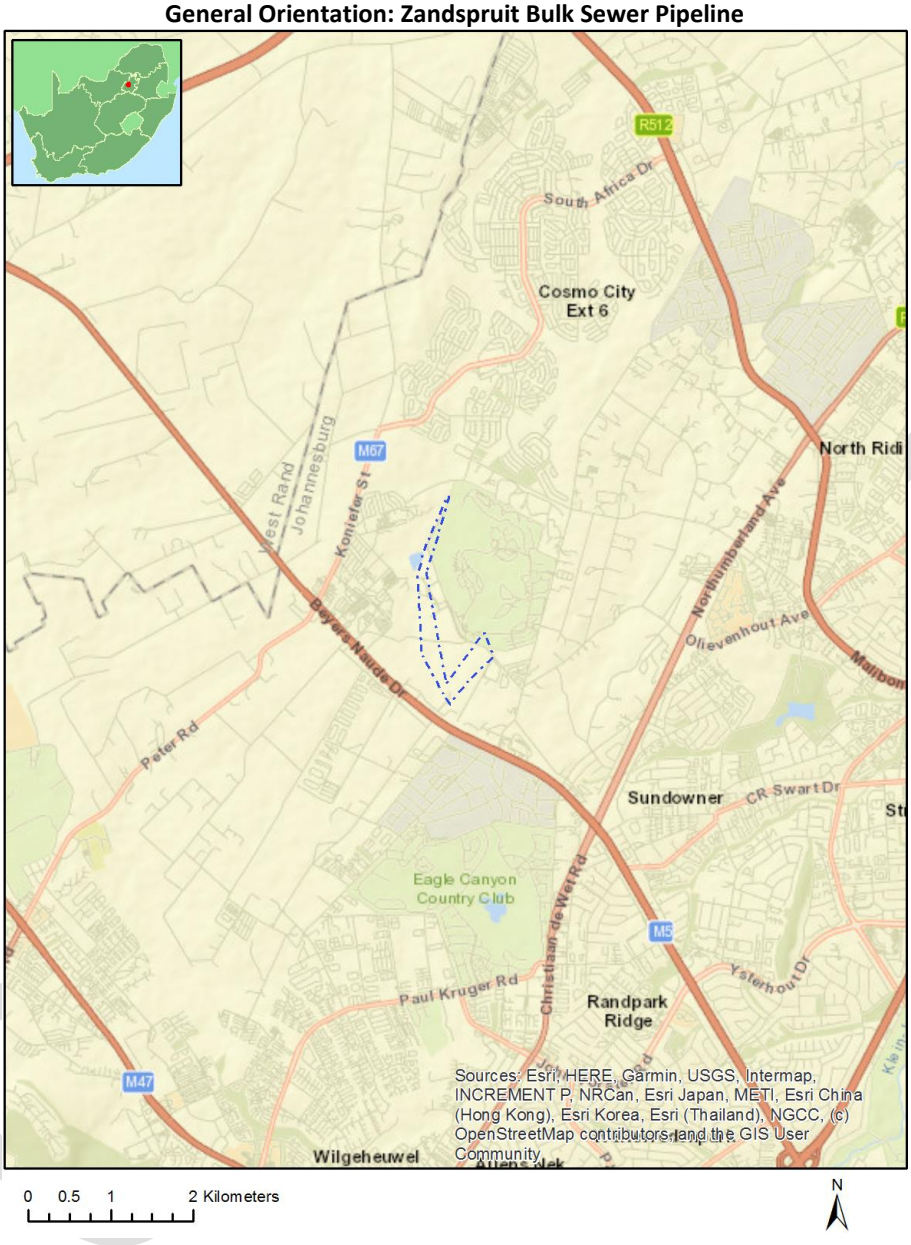
Application Category: Utilities Infrastructure|Pipelines|Water|Waste Water

Table of Contents

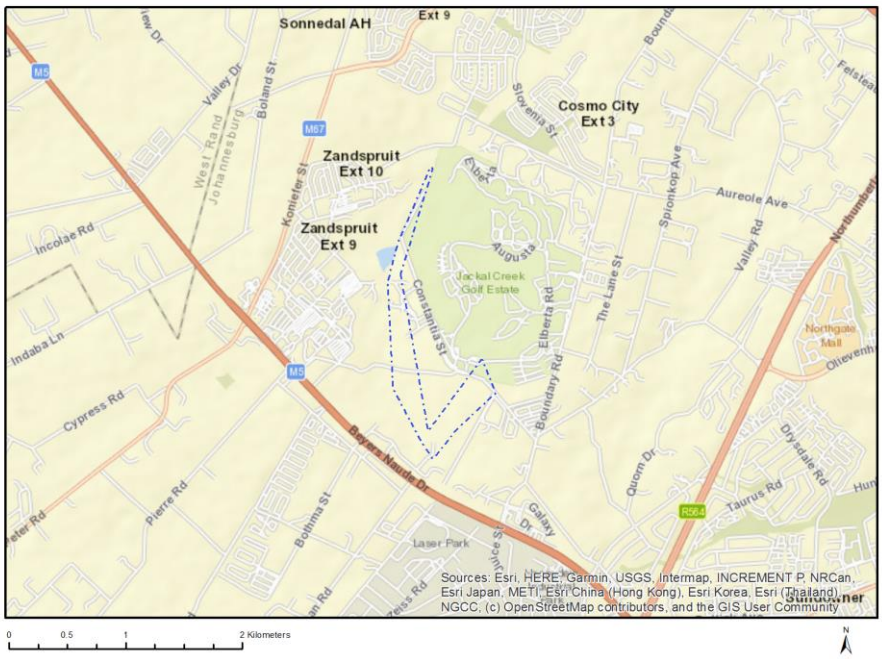
Proposed Project Location

Orientation map 1: General location

General Orientation: Zandspruit Bulk Sewer Pipeline



Map of proposed site and relevant area(s)



Cadastral details of the proposed site

Property details:

No	Farm Name	Farm/ Erf No	Portion	Latitude	Longitude	Property Type
1	ZANDSPRUIT	754	0	26°3'48.13S	27°55'6.94E	Erven
2	ZANDSPRUIT	709	0	26°3'51.39S	27°55'12.69E	Erven
3	ZANDSPRUIT	647	0	26°3'14.46S	27°55'0.2E	Erven
4	ZANDSPRUIT	711	0	26°3'50.64S	27°55'12.04E	Erven
5	ZANDSPRUIT	707	0	26°3'52.39S	27°55'12.16E	Erven
6	ZANDSPRUIT	712	0	26°3'49.98S	27°55'11.95E	Erven
7	ZANDSPRUIT	747	0	26°3'48.97S	27°55'11.71E	Erven
8	ZANDSPRUIT	732	0	26°3'53.73S	27°55'13.3E	Erven
9	ZANDSPRUIT	746	0	26°3'52.92S	27°55'12.82E	Erven
10	ZANDSPRUIT	708	0	26°3'51.47S	27°55'11.87E	Erven
11	ZANDSPRUIT	733	0	26°3'52.88S	27°55'14.75E	Erven
12	ZANDSPRUIT	987	0	26°3'47.95S	27°55'14.84E	Erven
13	ZANDSPRUIT	731	0	26°3'54.67S	27°55'14.17E	Erven
14	ZANDSPRUIT	985	1	26°3'47.39S	27°55'10.17E	Erven
15	ZANDSPRUIT	191	0	26°1'48.44S	27°55'11.77E	Farm
16	ZANDSPRUIT	191	92	26°4'10.56S	27°54'59.02E	Farm Portion
17	ZANDSPRUIT	191	95	26°3'56.35S	27°55'9.51E	Farm Portion
18	ZANDSPRUIT	191	234	26°3'7.76S	27°55'2.96E	Farm Portion
19	ZANDSPRUIT	191	20	26°3'56.25S	27°55'18.89E	Farm Portion
20	ZANDSPRUIT	191	236	26°3'49.93S	27°55'23.76E	Farm Portion
21	ZANDSPRUIT	191	88	26°4'2.65S	27°55'13.69E	Farm Portion
22	ZANDSPRUIT	191	232	26°3'41.04S	27°54'59.83E	Farm Portion
23	ZANDSPRUIT	191	144	26°3'10.52S	27°54'46.54E	Farm Portion
24	ZANDSPRUIT	191	23	26°3'38.83S	27°54'35.31E	Farm Portion
25	ZANDSPRUIT	191	307	26°2'49.84S	27°54'41.54E	Farm Portion
26	ZANDSPRUIT	191	93	26°4'6.44S	27°55'2.44E	Farm Portion
27	ZANDSPRUIT	191	237	26°3'47S	27°55'3.25E	Farm Portion
28	ZANDSPRUIT	191	17	26°3'30.79S	27°54'45.2E	Farm Portion

29	ZANDSPRUIT	191	91	26°4'16.05S	27°54'56.14E	Farm Portion
30	ZANDSPRUIT	191	94	26°4'1.78S	27°55'5.53E	Farm Portion
31	ZANDSPRUIT	191	245	26°3'51.83S	27°55'12.03E	Farm Portion
32	ZANDSPRUIT	191	304	26°3'54.6S	27°54'47.57E	Farm Portion
33	SONNEDAL AH	42	0	26°3'21.83S	27°54'45.95E	Agri Holding
34	SONNEDAL AH	44	0	26°3'30.87S	27°54'43.62E	Agri Holding
35	SONNEDAL AH	46	0	26°3'34.76S	27°54'52.6E	Agri Holding
36	SONNEDAL AH	48	0	26°3'43.19S	27°54'55.89E	Agri Holding
37	SONNEDAL AH	45	0	26°3'27.9S	27°54'48.85E	Agri Holding
38	SONNEDAL AH	47	0	26°3'37.13S	27°54'48.48E	Agri Holding
39	ZANDSPRUIT	2542	0	26°2'55.24S	27°54'54.26E	Public Place

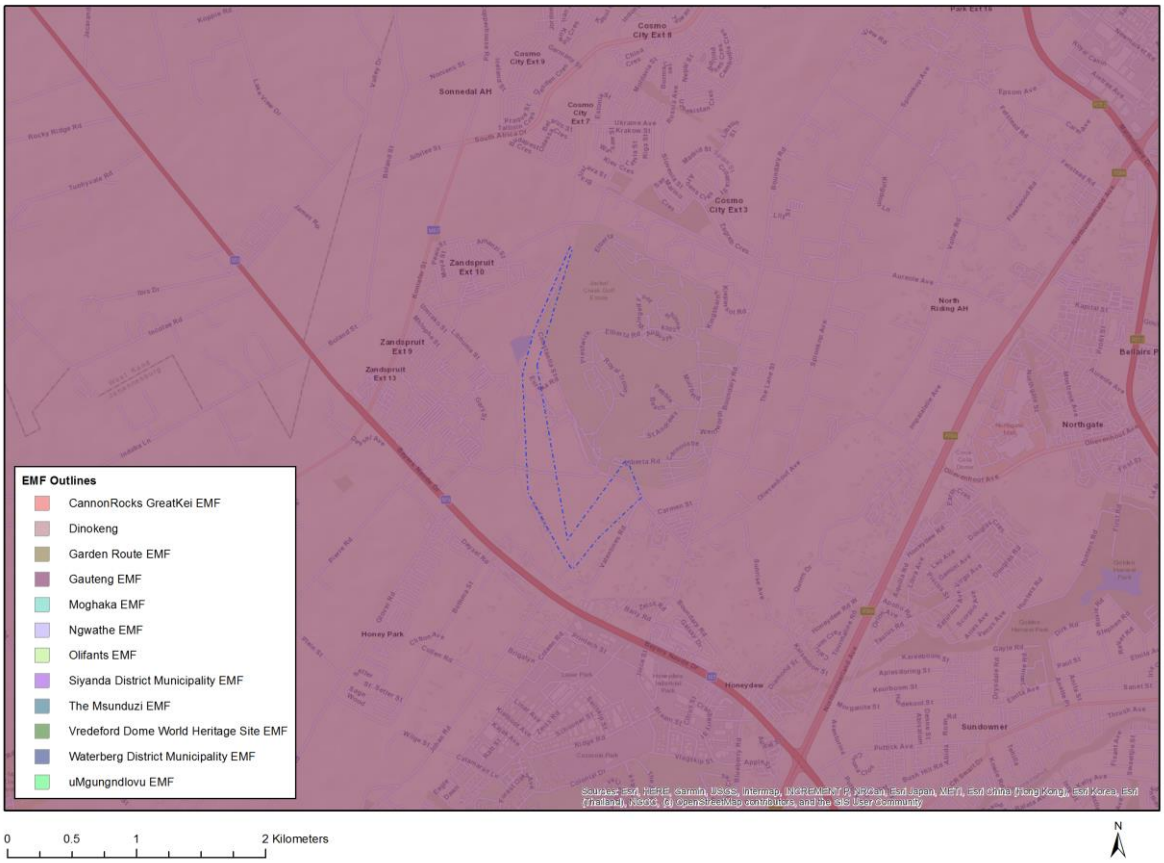
Development footprint[1] vertices:
No development footprint(s) specified.

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

No	EIA Reference No	Classification	Status of application	Distance from proposed area (km)
1	12/12/20/2551	Solar PV	Approved	20.7
2	12/12/20/2537	Solar PV	Approved	24.9
3	12/12/20/2539	Solar PV	Approved	18.4
4	12/12/20/2530	Solar PV	Approved	18.7

[1] "development footprint", means the area within the site on which the development will take place and incudes all ancillary developments for example roads, power lines, boundary walls, paving etc. which require vegetation clearance or which will be disturbed and for which the application has been submitted.

Environmental Management Frameworks relevant to the application



Environmental Management Framework	LINK
Gauteng EMF	https://screening.environment.gov.za/ScreeningDownloads/EMF/Zone_1,_Zone_2,_Zone_3,_Zone_4,_Zone_5.pdf

Environmental screening results and assessment outcomes

The following sections contain a summary of any development incentives, restrictions, exclusions or prohibitions that apply to the proposed development site as well as the most environmental sensitive features on the site based on the site sensitivity screening results for the application classification that was selected. The application classification selected for this report is: **Utilities Infrastructure|Pipelines|Water|Waste Water**.

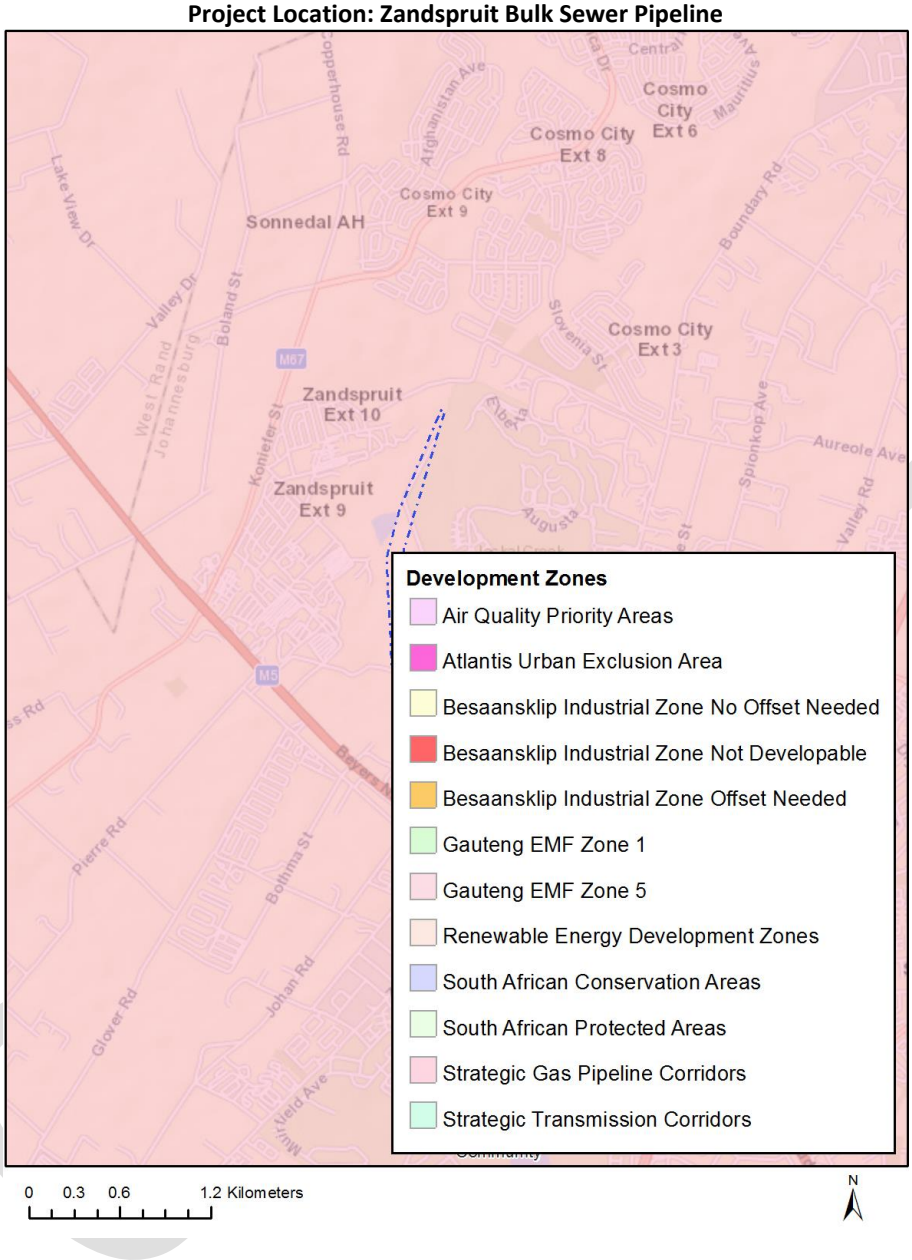
Relevant development incentives, restrictions, exclusions or prohibitions

The following development incentives, restrictions, exclusions or prohibitions and their implications that apply to this site are indicated below.

Incentive, restriction or prohibition	Implication
Strategic Transmission Corridor-Central corridor	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/Combined_EGI.pdf
Gauteng EMF-Urban development zone 1	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/Zone_1.pdf
Strategic Gas Pipeline Corridors-Phase 3: Richards Bay to Gauteng	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/Combined_GAS.pdf

Map indicating proposed development footprint within applicable development incentive, restriction, exclusion or prohibition zones

Project Location: Zandspruit Bulk Sewer Pipeline



Proposed Development Area Environmental Sensitivity

The following summary of the development site environmental sensitivities is identified. Only the highest environmental sensitivity is indicated. The footprint environmental sensitivities for the proposed development footprint as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme		X		

Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme		X		
Civil Aviation Theme		X		
Defence Theme				X
Plant Species Theme			X	
Terrestrial Biodiversity Theme	X			

Specialist assessments identified

Based on the selected classification, and the environmental sensitivities of the proposed development footprint, the following list of specialist assessments have been identified for inclusion in the assessment report. It is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the site situation.

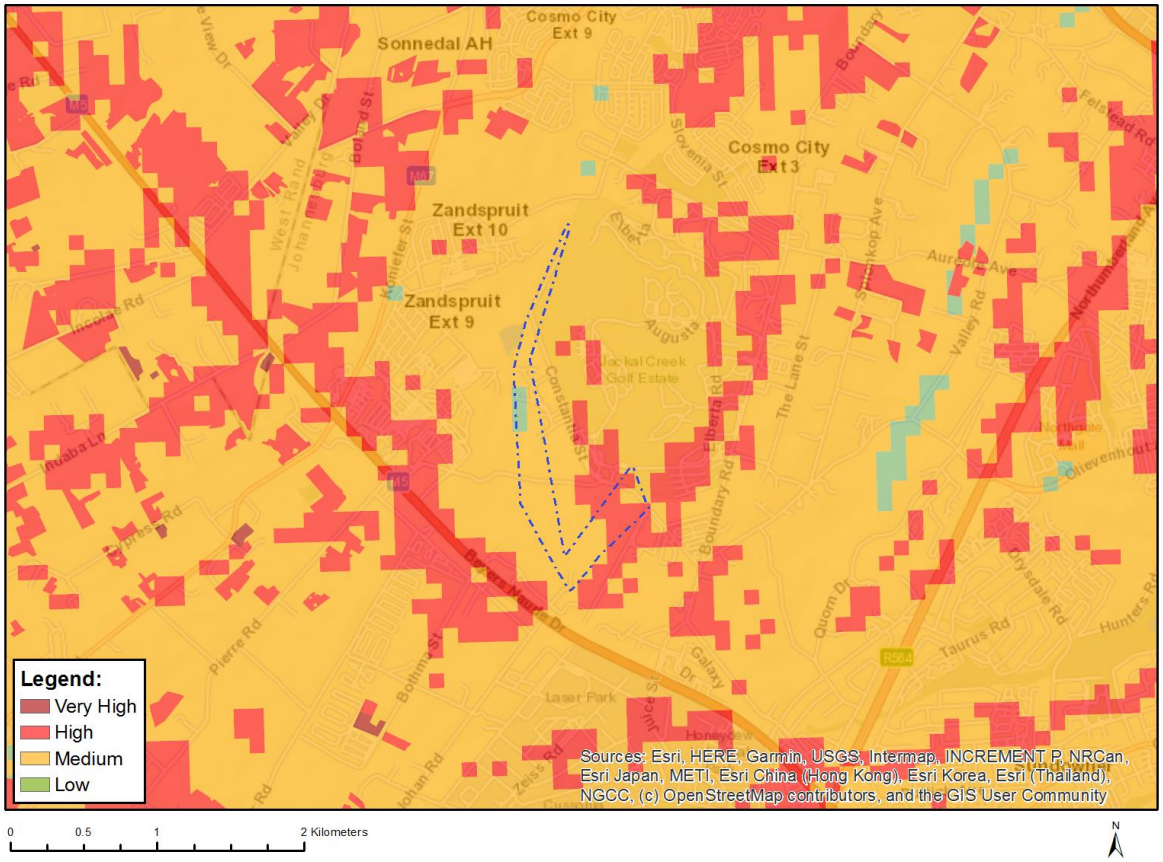
No	Specialist assessment	Assessment Protocol
1	Agricultural Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Agriculture_Assessment_Protocols.pdf
2	Archaeological and Cultural Heritage Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
3	Palaeontology Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
4	Terrestrial Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf
5	Aquatic Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf
6	Hydrology Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf

7	Geotechnical Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
8	Socio-Economic Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
9	Seismicity Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
10	Plant Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Plant_Species_Assessment_Protocols.pdf
11	Animal Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Animal_Species_Assessment_Protocols.pdf

Results of the environmental sensitivity of the proposed area.

The following section represents the results of the screening for environmental sensitivity of the proposed site for relevant environmental themes associated with the project classification. It is the duty of the EAP to ensure that the environmental themes provided by the screening tool are comprehensive and complete for the project. Refer to the disclaimer.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY

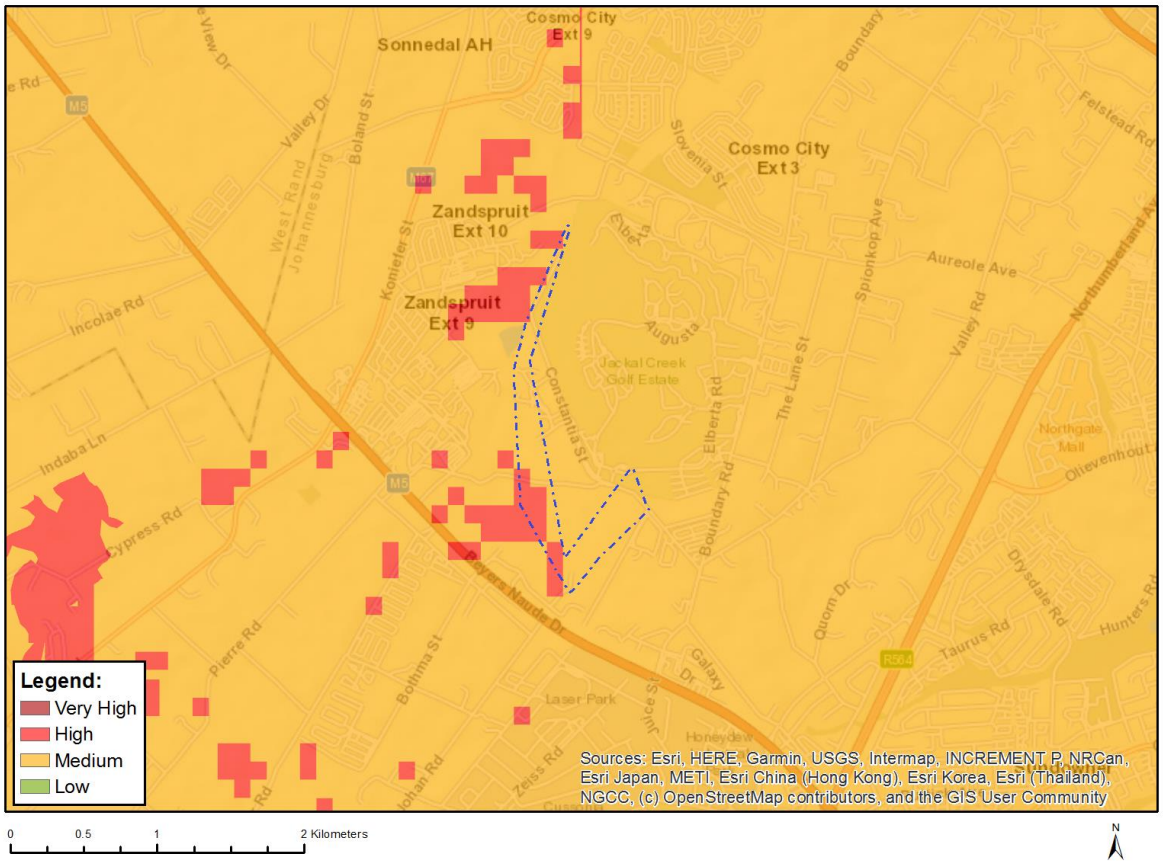


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Land capability;09. Moderate-High/10. Moderate-High
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



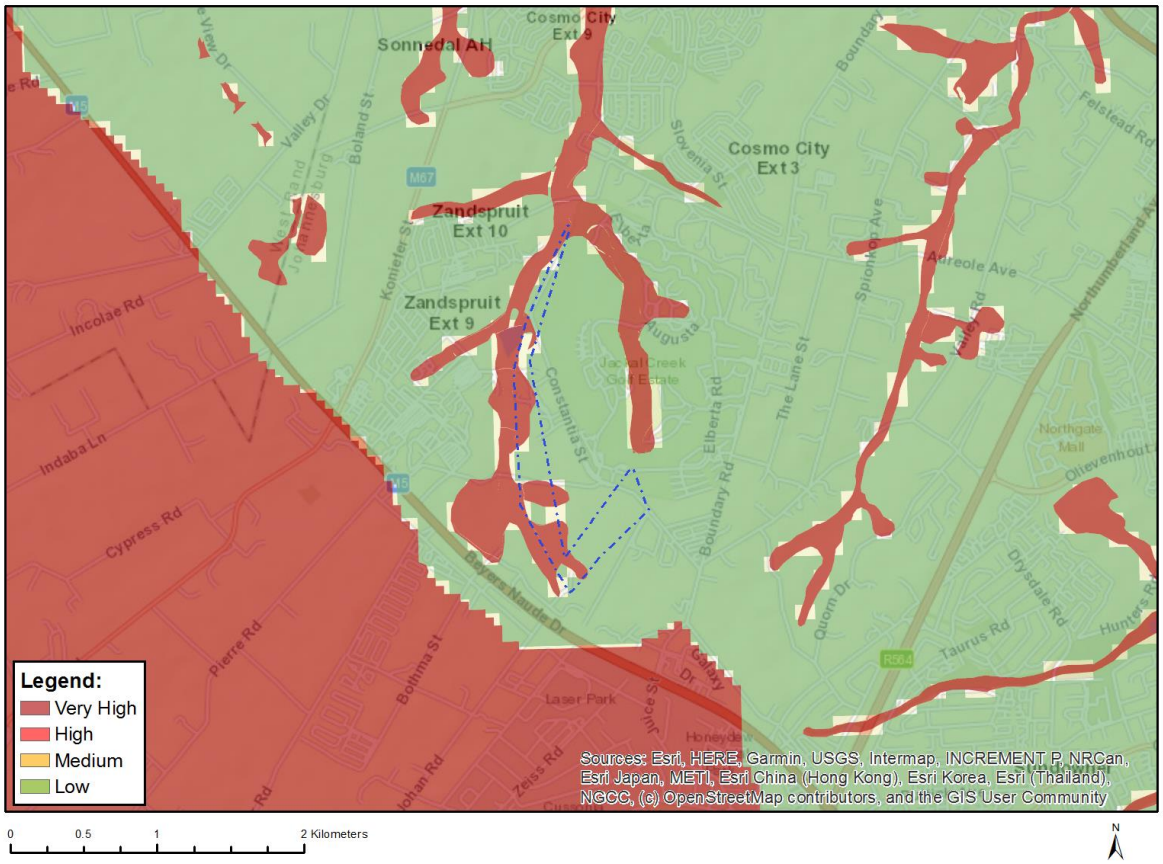
Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Tyto capensis
Medium	Insecta-Aloeides dentatis dentatis
Medium	Mammalia-Chrysospalax villosus
Medium	Mammalia-Crocidura maquassiensis
Medium	Mammalia-Dasymys robertsii
Medium	Mammalia-Hydrictis maculicollis
Medium	Mammalia-Ourebia ourebi ourebi
Medium	Invertebrate-Clonia uvarovi

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY

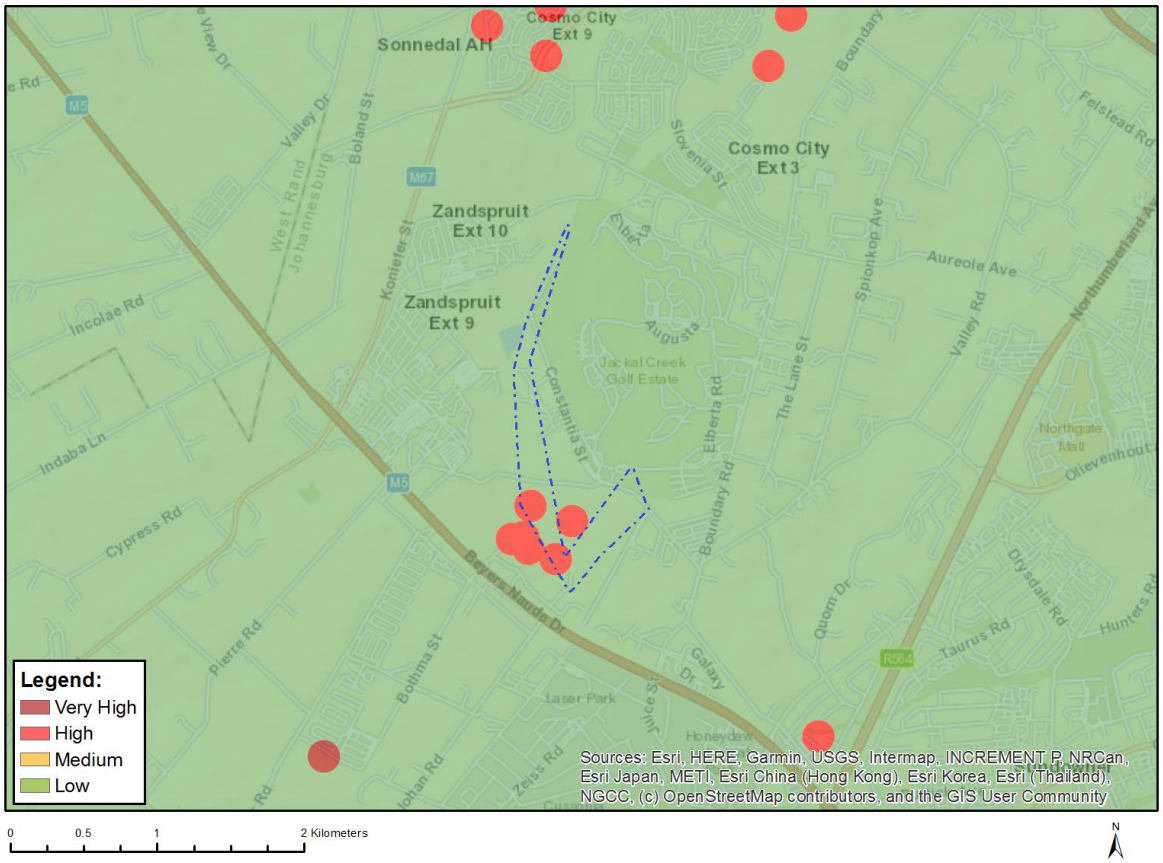


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity
Very High	Wetlands and Estuaries

MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY

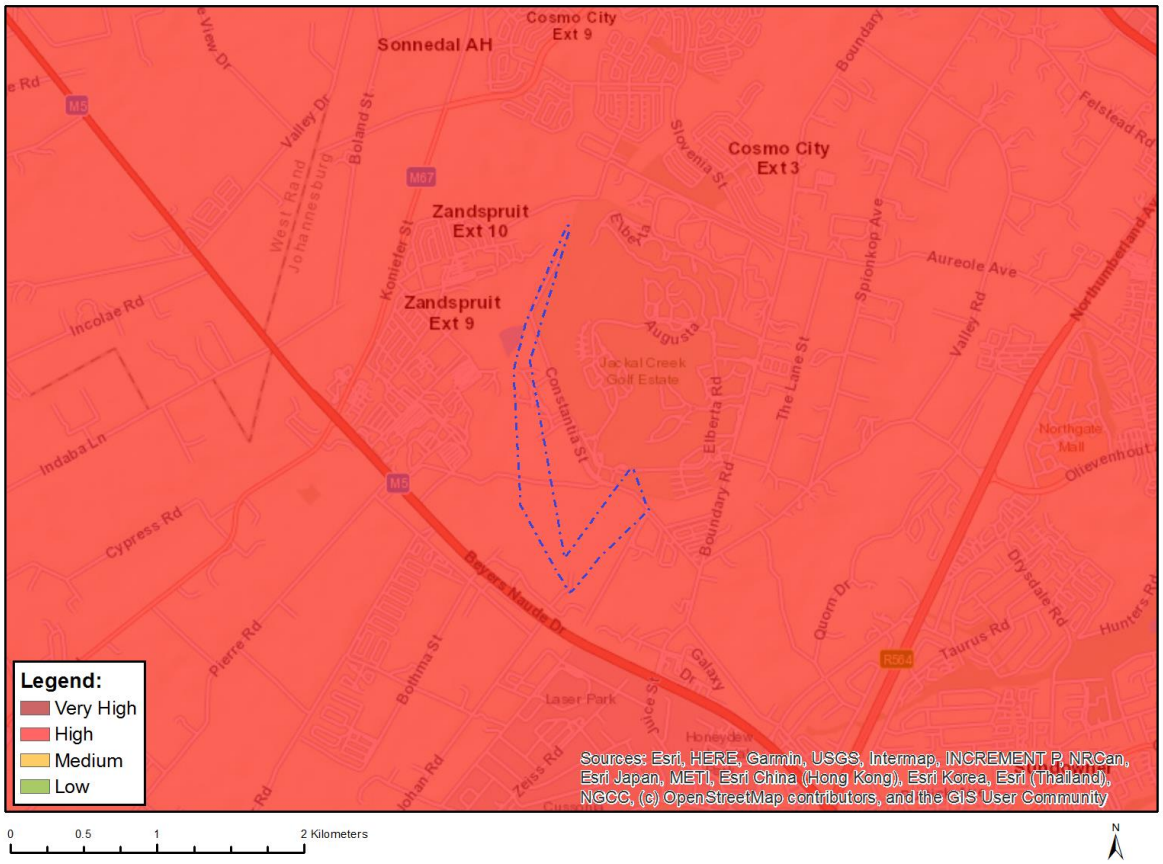


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Within 100m of a Grade IIIb Heritage site
Low	Low sensitivity

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY

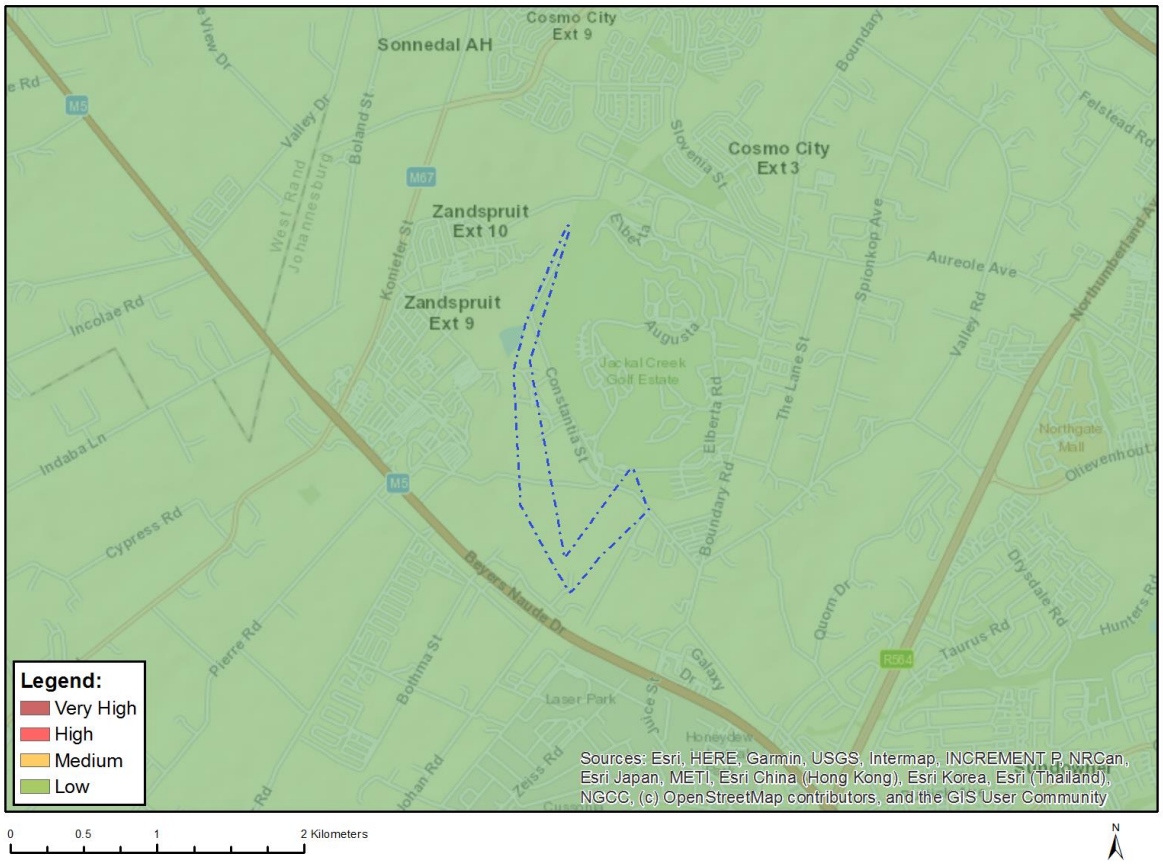


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Between 8 and 15 km from a major civil aviation aerodrome
High	Within 8 km of other civil aviation aerodrome
Medium	Between 15 and 35 km from a civil aviation radar

MAP OF RELATIVE DEFENCE THEME SENSITIVITY

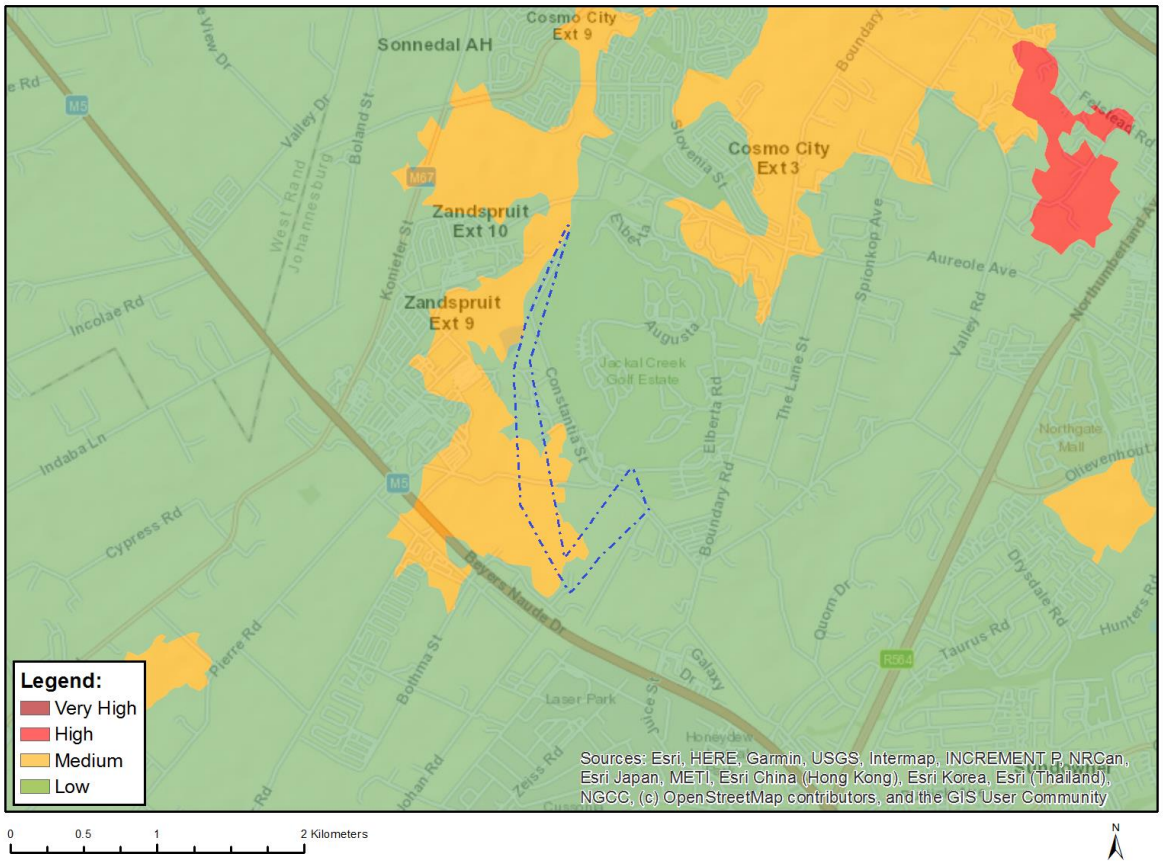


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



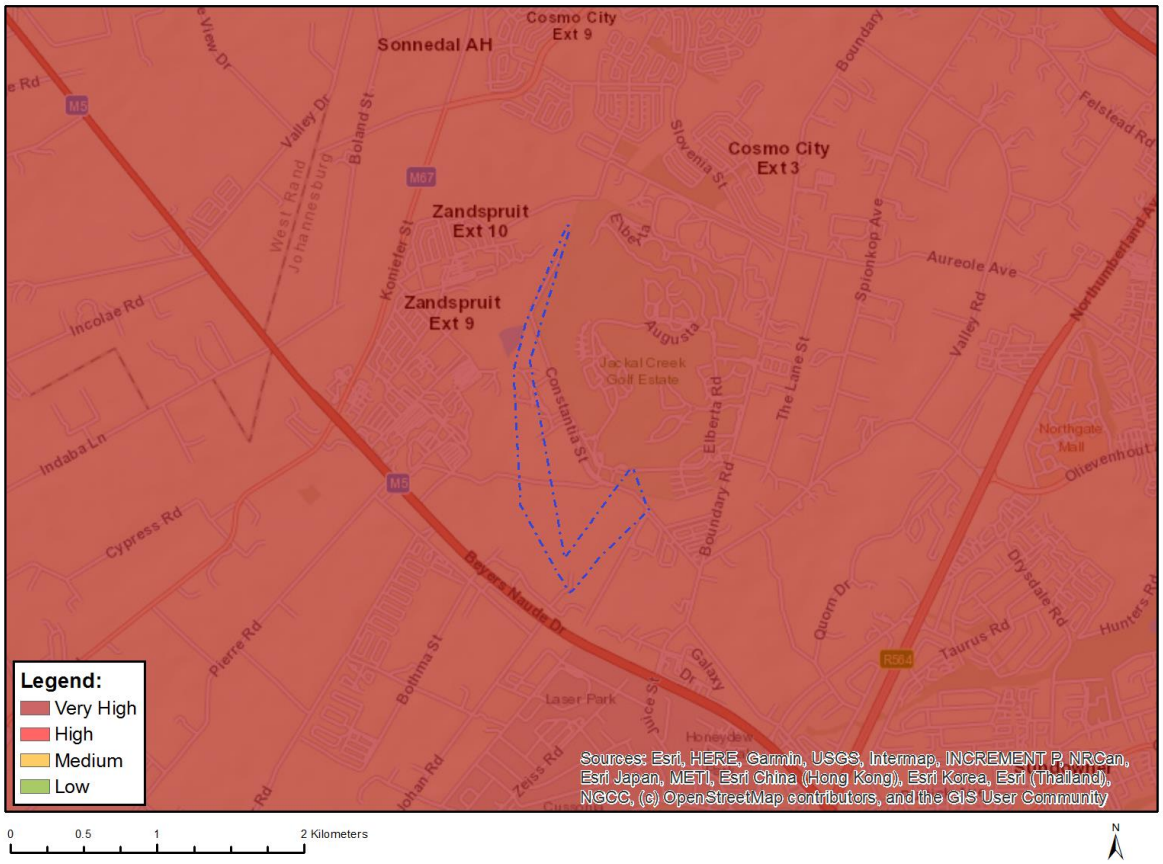
Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Medium	Melolobium subspicatum
Medium	Sensitive species 1248

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	Critical biodiveristy area 2
Very High	Ecological support area
Very High	Protected Areas Expansion Strategy
Very High	Endangered ecosystem

ZANDSPRUIT BULK SEWER LINE, PORTIONS OF THE FARM ZANDSPRUIT 191 IQ, CITY OF JOHANNESBURG, GAUTENG.

Specialist Watercourse Impact and Rehabilitation Assessment and Monitoring Plan

September 2022

Drafted by
Limosella Consulting Pty Ltd
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Email: antoinette@limosella.co.za
Cell: +27 83 4545 454, www.limosella.co.za

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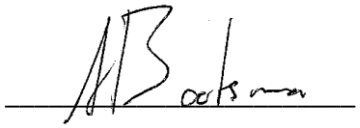
Email: info@envirolution.co.za
www.envirolution.co.za

Declaration of Independence

I, **Antoinette Bootsma**, in my capacity as a specialist consultant, hereby declare that I -

- Act as an independent consultant;
- Do not have any financial interest in the undertaking of the activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act 107 of 1998);
- Undertake to disclose, to the competent authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the National Environmental Management Act, 1998 (Act 107 of 1998);
- As a registered member of the South African Council for Natural Scientific Professions, will undertake my profession in accordance with the Code of Conduct of the Council, as well as any other societies to which I am a member; and
- Based on information provided to me by the project proponent, and in addition to information obtained during the course of this study, have presented the results and conclusion within the associated document to the best of my professional judgement.



2022.09.27

Antoinette Bootsma (PrSciNat) Date

Ecologist/Botanist

SACNASP Reg. No. 400222-09

Document and Quality Control

Project name: Zandspruit Bulk Sewer Line, Portions of the Farm Zandspruit 191 IQ, City of Johannesburg, Gauteng			
Nature of Signoff	**Responsible Person**	**Role/Responsibility**	**Qualifications**
Author – Wetland component	Antoinette Bootsma	Senior Wetland Specialist	MSc Unisa, Environmental Science Pr.Sci.Nat (400222/09)
Document number	**Checked by:**	**Electronic Signature:**	**Date**
Technical Review	Antoinette Bootsma		2022.09.26
Client review			
Final Report	Antoinette Bootsma		

Table of Contents

Figures

Tables

1 INTRODUCTION

Limosella Consulting was appointed by Envirolution Consulting to undertake a Risk Assessment for the proposed bulk sewer line on the Farm Zandpsruit 191 IQ, City of Johannesburg. Bokamoso Landscape Architects and Environmental Consultants undertook a wetland assessment to inform the Environmental Authorisation for this activity. Their report, dated July 2022 provides an assessment of wetlands potentially affected by the sewer line referred to in this risk assessment. No additional fieldwork was to inform the current Risk Assessment.

The new sewer line connects to an existing sewer line that is situated along Constantia Street, and west of the Jackal Creek Golf Estate. The line is approximately 2.08km in length.

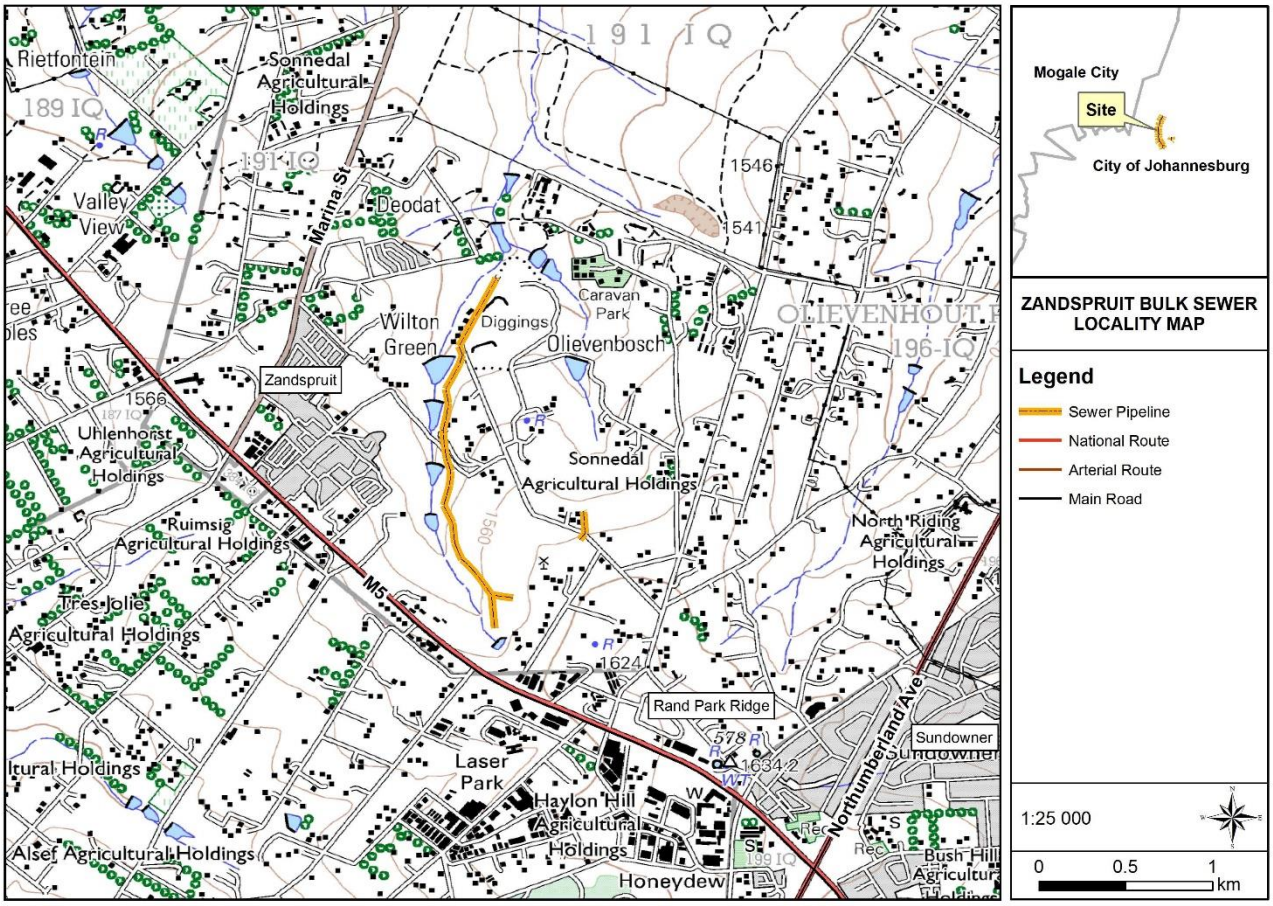


Figure 1: Location of the proposed infrastructure

1.1 Assumptions and limitations

- This document is based on information as received by Envirolution Consulting and is limited to the sewage infrastructure in Zandspruit, located adjacent to a valley bottom wetland and hillslope seeps and across a section of riparian habitat
- The document takes into account likely impacts that can arise during the construction of the new or upgraded sewerage infrastructure. However, some unique impacts may arise that must be recorded during monitoring and appropriate corrective actions taken.

- This report recognises that the scope of the proposed activities in the DWS regulated area include:
    - Installation of new sewerage pipeline infrastructure, and
    - Tie in infrastructure.
- Two options are discussed, installation of the sewerage line underground, or above ground.

1.2 Objective and aims

The watercourse rehabilitation and monitoring plan is specific to the construction of the proposed sewage infrastructure adjacent to an in the buffer zone of a watercourses. Trenching in the watercourse and its buffer zone will have to be rehabilitated carefully, with effective mitigation to prevent disturbance of adjacent sections of the watercourse. Further potential impacts are associated with activities upslope which may affect the watercourse downslope, for example, earthworks upslope which may result in sediment washing into the downslope wetland during heavy rain.

This document aims to limit localised impacts relating to the construction and to prevent further degradation of the watercourses in the catchment. It also aims to encourage local improvements on the study site and immediate surrounds.

The overall objective is to return the environment in and around footprint of the infrastructure to a state as close to the state prior to construction and to limit or negate any construction and operational associated impacts by:

- Ensuring the footprint of the impact on the watercourses is as small as possible;
- Ensuring that the planning phase takes watercourse rehabilitation and monitoring into account for both the construction and operational phase;
- Ensuring that the positioning of the proposed pipeline and operation does not lead to any further degradation in the Ecological Category of the watercourses;
- Employing preventative measures during the construction phase;
- Providing guidance on rehabilitation of areas that are temporarily disturbed during construction;
- Reducing the likelihood of erosion and subsequent sedimentation during construction and operation; and
- Recommending monitoring and corrective actions to mitigate impacts as soon as they become apparent.

2 METHODOLOGY

In order to protect biodiversity and conserve sensitive environments during development, steps that should be followed are to firstly avoid, then minimize, then repair or restore, and finally compensate for, or offset, the negative effects of any development on biodiversity (SANBI, 2011). Therefore, where the impact is unavoidable, the impacts must be minimised and the unavoidable and unforeseen impacts restored or

rehabilitated. Rehabilitation refers to the measures that are undertaken to return impacted areas to their pre-impact natural state and can occur as an on-going and integral activity during the construction activity. From the perspective of minimizing impacts on biodiversity and ecosystem services, on-going rehabilitation to indigenous vegetation during the construction is preferred as it effectively reduces the time lag during which negative impacts endure. To realise the objective of the rehabilitation plan, it is necessary to limit the impact as much as possible to reduce the need for costly rehabilitation and corrective action. Therefore, mitigation should already start in the planning phase to direct construction to have the least impact possible, reducing follow-up rehabilitation and corrective actions. Therefore, this rehabilitation document comprises of three plans (Table 1):

1. Mitigation Plan: to focus pre-construction planning and activities on limiting the possible impacts that can arise during construction.
2. Rehabilitation Plan: aimed at rehabilitating the areas temporarily disturbed by the construction. This document recognises that construction will entail three phases.
3. Monitoring Plan: aimed at monitoring the success of rehabilitation as well as recording any impacts that may arise during the operational phase of the pipeline (including maintenance), for which corrective action is needed.

Table 1: Plans in relation to the relevant project phases

Plan	Project Phases
1. Mitigation plan	• Pre-construction planning and activities • Construction • Operation
2. Rehabilitation plan	• Construction • Operation
3. Monitoring and corrective action	• Construction • Operation

3 DESCRIPTION OF ENVIRONMENT AND WATERCOURSES AFFECTED

According to available geological maps, the study site is underlain by the Halfway House Granite Dome, with a line of De Banken Gneiss transecting the site along Constantia Street. Soils have a limited depth. This geological setting corresponds to the Egoli Granite Grassland vegetation unit of the Mesic Highveld Grassland Bioregion in the Grassland Biome (Mucina & Rutherford, 2010), (Bokamoso, 2022)

3.1 Delineated Water Courses

Two wetland HGM units occur within 500m of the study site, namely a Channelled Valley Bottom wetland associated with the Sandspruit, and extensive Hillslope Seeps. The seep wetlands cover an estimated total area of 29ha. It is not possible to determine the full historic extent of the seeps, as the informal settlement and other developments have replaced large portions of the hillslopes surrounding the river. **Error!**

Reference source not found. Figure 2 below presents the delineated watercourses together with their associated buffer zones (Bokamoso, 2022).

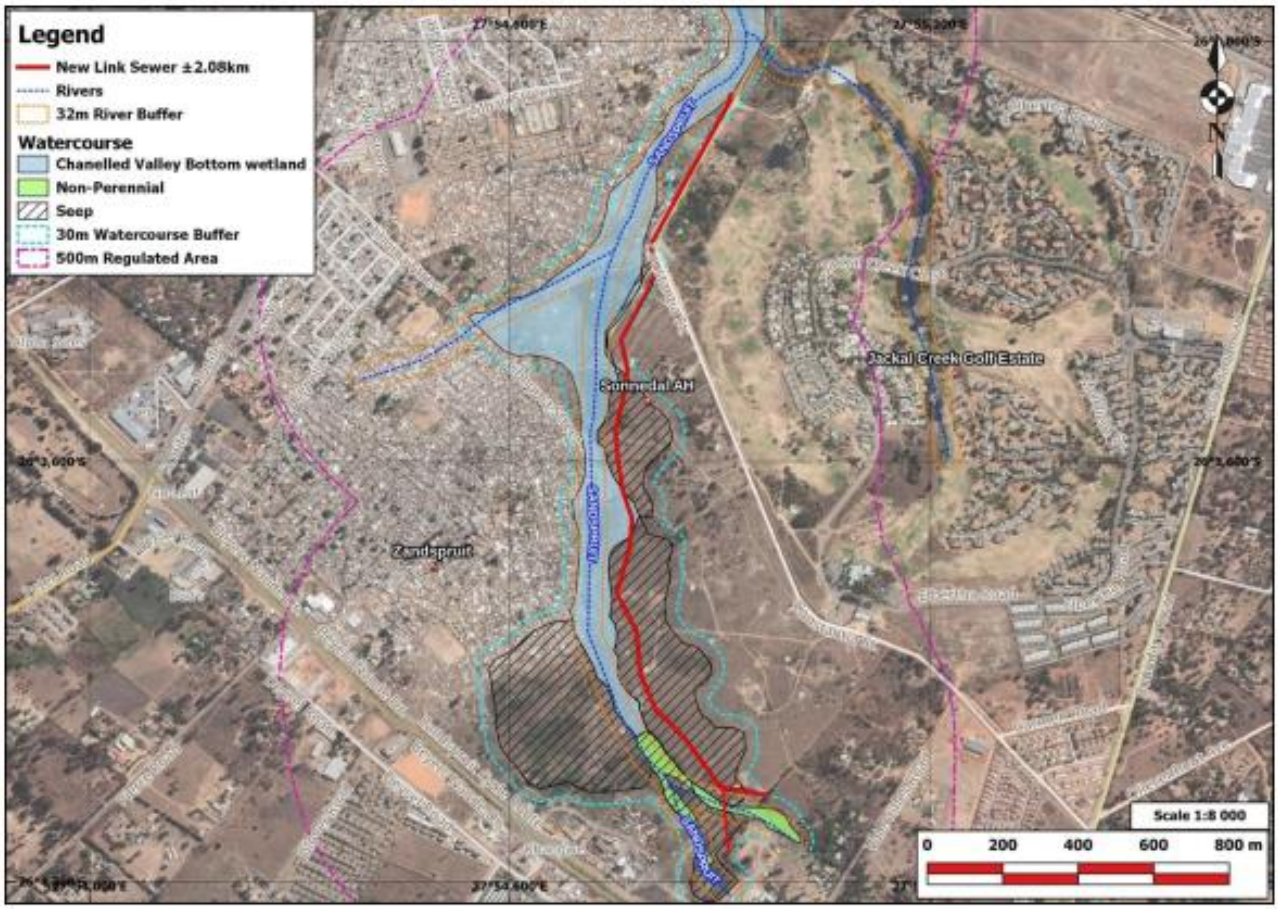


Figure 2: The delineated watercourse associated with the study site and surroundings

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3.2 Wetland Integrity and Function

The watercourses discussed in this report is highly transformed and has dramatically deteriorated from the theoretical natural state. A large increase in water, including from sewerage and wastewater treatment works contribute to a decrease in water quality. The vegetation component has been impacted by a large increase in Alien Invasive Species.

3.2.1 Overview

The wetland integrity presented in Bokamoso indicates the Channelled Valley Bottom wetland is in a class D category which refers to wetlands that are largely modified. In this category, the change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural features are still evident. Wetland conditions are expected to deteriorate due to the expanding informal settlement and further planned development in the surrounding areas (Bokamoso, 2022).

The seepage wetlands are placed in a lass **C - Moderately modified**. The change in ecosystem processes and loss of natural habitat and biota is moderate and loss of natural habitat and biota has occurred. Wetland conditions are expected to deteriorate. Development is planned to increase significantly in the area, which will change flow patterns, increase runoff from hard surfaces and change catchment characteristics (Bokamoso, 2022).

The EIS scores indicate that both wetlands are classed as **C - Moderate**. The wetlands are ecologically important and sensitive on a local scale. The wetlands play a part in moderating downstream quantity and quality of the Sandspruit. Impacts from development and the expanding informal settlement are a threat to the wetland habitat and ecosystem functions (Bokamoso, 2022).

4 EXPECTED IMPACTS

Impacts expected to be associated with the proposed sewerage infrastructure adjacent to the watercourses and associated buffer zones are associated with earthworks in the construction phase, and potential spills during the operational phase.

Laying the pipes underground by trenching in the granitic soils, shallow interflow may be intercepted in the trench. Unattenuated release of intercepted water will result in local erosion. A section of pipeline lies across the southern extent of the watercourse. Temporary disturbance of local wetland habitat, sedimentation and construction-related pollution can significantly alter the specialised habitat. Locating the pipeline above ground will also disturb the wetland by trampling, compaction and establishment of alien invasive vegetation.

The potential spill of sewage, should infrastructure fail, will result in significant negative impacts to water quality. Both alternatives will require extensive maintenance in the long term.

A section of pipeline lies across the southern extent of the watercourse. Temporary disturbance of local wetland habitat, sedimentation and construction-related pollution can significantly alter the specialised habitat. The potential spill of sewage, should infrastructure fail, will result in significant negative impacts to water quality. It is important that any mitigation be implemented in the context of an Environmental Management Plan to ensure accountability and ultimately the success of the mitigation. These potential impacts are discussed briefly below.

Changing the physical structure within a water resource: Trenching through a watercourse will have a significant impact on the morphology of the watercourse during the construction phase which will affect the structure of the watercourse. when activities upslope, will result in sediment washing into the downslope watercourse which may affect its structure. This disturbance may extend into the operational phase if the trench is not correctly rehabilitated.

Changing or impeding the flow of water: Flow modification entails changes to the hydrological regime. This is particularly important since embedded pipelines change subsurface water flowpaths by intercepting lateral seepage water and form preferential flowpaths. This impact may result in significant changes to wetland hydrology. Flow of surface water may be changed by structures used for watercourse crossings (including running tracks) that function as flow obstructions.

Clearing/removal of natural vegetation: The plants that grow in wetlands are vital for preventing erosion, they play a role in the purification of water, reducing the severity of floods and regulating water, especially during droughts. The moment the vegetation is destroyed, these valuable functions disappear. In addition, vegetation around watercourses, especially upslope, holds soil in place and slows down water runoff during rainy events. The vegetation thus promotes groundwater recharge, while protecting soils from eroding, subsequently causing sedimentation in watercourses.

Compaction of soils: Construction activities may compact soils from heavy equipment access which could inhibit seed germination, reduce water infiltration, inhibit root establishment, and result in bare soil exposure. In particular, soil compaction can lead to an increase in runoff during rainy events, especially in the footprint of the excavated trench. Soil compaction is expected to occur during clearing of the servitude, construction and maintenance (operational phase).

Exposure to erosion: Removal of stream bank vegetation, vegetation against slopes and compaction of soils, expose the resulting bare soils to erosion during rainfall events. Erosion removes the top soil layer, thereby preventing the successful establishment of indigenous vegetation on eroded soils. Eroded areas are likely to be colonised by alien invasive and pioneer plants, or in severe cases, no vegetation will establish causing high velocity runoff during rainfall events and continuous erosion. Furthermore, erosion is a particular risk where pipeline sections are to be installed where erosion damage is already evident (for example, upstream from headcut erosion features).

Sedimentation of wetlands and rivers: Soil erosion could lead to increased sedimentation and turbidity downstream of the activity, which in turn reduce the water storage capacity thereof, smother vegetation, and decrease oxygen concentration. If sedimentation is allowed to continue, watercourses will lose their integrity and likely become invaded by alien invasive plant species.

Mobilisation of pollutants: Accidental pollution or illegal disposal and dumping of construction material such as cement or oil, as well as disposal or discharge of sewage into water resources will influence the water quality, thereby influencing its functionality and the persistence of vegetation. Water may seep into trenches where the pipeline is to be installed and may become contaminated. Furthermore, the surrounding areas are already exposed to pollution which during high rainfall events could be washed into the watercourse– especially if vegetation cover is not sufficient to slow down water and filter pollutants. Pollution resulting from spills in the Operational phase should be addressed in a dedicated rehabilitation plan that addresses the particular characteristics of a particular spill.

Invasion by alien invasive vegetation: During construction, vegetation will be removed and soil disturbed. The seeds of alien invasive species that occur on and in the vicinity of the construction area could spread into the disturbed or stockpiled soils. In addition, the construction vehicles and equipment were likely used on various other sites and could introduce alien invasive plant seeds to the construction sites. From these construction sites, alien invasive plant species can easily spread downstream, likely resulting in offsite impacts.

5 MITIGATION PLAN

On site mitigation can limit the impact of construction activities and reduce the need for expensive rehabilitation and the need for corrective action. In addition, sedimentation is very difficult and sometimes impossible to rehabilitate without further impacting on watercourses. Therefore, sedimentation should be prevented through mitigation. Table 2 list the mitigation measures that should be implemented during the planning and construction phase to limit the need for rehabilitation.

Table 2: Mitigation plan

Project Phase	Mitigation Objective	Mitigation to Limit Impact and Size of the Area to be Rehabilitated
Pre-construction planning	Limit the footprint of construction thereby reducing compaction and destruction of natural vegetation.	• The approved method statement must be available on site for reference purposes • Where possible plan construction activities to have the smallest possible footprint • Demarcate the construction footprint prior to commencement of construction and ensure that all workers and contractors are aware that access beyond the demarcated areas are not allowed. • Ensure that a copy of this and other applicable documents are available on site and that all workers and contractors are aware of it. Implementation thereof should be monitored by the appointed Environmental Officer (EO) or Environmental Control officer (ECO) • The height, width and length of structures must be limited to the minimum dimensions necessary to accomplish the intended function
Construction	Limit the construction footprint and related impacts	• Topsoil must be stripped and redistributed. Stockpiles' height is restricted to 2.5m in order to preserve the soil's microbiological and nutrient characteristics. • Limit the removal of indigenous vegetation in the construction footprint and do not remove vegetation outside of the construction footprint • The contractor must avoid traffic or storing of equipment and material in vegetated areas that will not be cleared
Construction	Prevention of pollution	• The contractors must provide and maintain a method statement for "cement and concrete batching". The method statement must provide information on proposed location, storage, washing & disposal of cement, packaging, tools and plant storage • Cement and plaster should only be mixed within mixing trays. Washing and cleaning of equipment should also be done within a bermed area (outside of the wetland buffer), in order to trap any cement or plaster and avoid excessive soil erosion. These sites must be rehabilitated prior to commencing the operational phase • The mixing of concrete should only be done at specifically selected sites on mortar boards or similar structures to contain run-off into drainage lines, streams and natural vegetation

Project Phase	Mitigation Objective	Mitigation to Limit Impact and Size of the Area to be Rehabilitated
Construction		• Materials such as fuel, oil, paint, herbicide and insecticides must be sealed and stored in bermed areas or under lock and key, as appropriate, in well-ventilated areas • These substances must be confined to specific and secured areas within the contractor's camp, and in a way that does not pose a danger of pollution even during times of high rainfall • Storage of materials as described above may not be within the 1:100 floodline, watercourses or associated buffer areas • In the case of pollution of any surface or groundwater, the Regional Representative of the Department of Water Affairs (DWS) must be informed immediately • All equipment should be parked overnight and/or fuelled at least 500 meters from a watercourse • Drip trays (minimum of 10cm deep) must be placed under all vehicles that stand for more than 24 hours. Vehicles suspected of leaking must not be left unattended, drip trays must be utilised. • Drip trays must be utilised during repairs and maintenance of all machinery. The depth of the drip tray must be determined considering the total amount / volume of oil in the vehicle. The drip tray must be able to contain the volume of oil in the vehicle • Provision of adequate sanitation facilities located outside of the wetland/riparian area or its associated buffer zone • Remove all construction equipment and material on completion of construction • No water should be abstracted from any river / wetland without DWS authorisation • Any hazardous substances must be handled according to the relevant legislation relating to transport, storage and use of the substance and all storage facilities must be equipped with large, clearly readable material safety data sheets

Project Phase	Mitigation Objective	Mitigation to Limit Impact and Size of the Area to be Rehabilitated
Construction	Prevent/limit sedimentation	• Increased run-off during construction must be managed using berms and other suitable structures as required to ensure flow velocities are reduced; this must be done in consultation with the ECO • Where wetlands are adjacent to the construction areas and these areas slopes toward the wetland, install sediment barriers along the edge of the construction areas as necessary to prevent sediment flow into the wetland • Sediment barriers must be properly maintained throughout construction and reinstalled as necessary until replaced by permanent erosion controls or restoration of adjacent upland areas is complete • It is important that topsoil should be conserved in areas where bedrock is shallow to avoid sedimentation
Construction	Stormwater Management	• Increased runoff due to vegetation clearance (promoting limiting vegetation clearance at a time) and/or soil compaction must be managed and steps taken to ensure that stormwater does not lead to bank instability and excessive levels of silt entering the watercourse(s). • Stormwater must be diverted from construction works, access roads, linear infrastructure and other areas associated infrastructure and must be managed in such a manner as to disperse runoff and prevent the concentration of stormwater flow. • Stormwater leaving the development area must in no way be contaminated by any substance, whether such substance is a solid, vapour, gas or a combination thereof which is produced, used, stored or spilled on the premises. • No other discharges into any watercourse (directly or indirectly) are allowed). • Sheet runoff from paved, hardened and compacted surfaces and access roads must be prevented from entering the watercourse.

Project Phase	Mitigation Objective	Mitigation to Limit Impact and Size of the Area to be Rehabilitated
	Maintenance of biodiversity and preventing spread of alien invasive	• Indigenous vegetation, including dead trees, outside the limits of disturbance indicated in site plans must not be removed from the site • All reasonable steps must be taken not to disturb the breeding, nesting and/or feeding habitats and natural movement patterns of aquatic biota • Alien invasive species that where identified within servitudes should be removed prior to construction related soil disturbances. This will prevent seed spreading into disturbed soils • If herbicide must be used it should be registered for aquatic use and be approved for use by the Environmental Control Officer • A register of the methods used, dates undertaken, as well as herbicides and dosage used must be kept and available on site. The register must also include incidents of poisoning or spillage • Ensure that contractors can identify the relevant plants and are aware of the removal procedures
Operation	Prevention of pollution	• The contractor shall ensure that a method statement is prepared prior to maintenance work to ensure that excessive quantities of sand, silt and silt-laden water do not enter watercourses. Appropriate measures, e.g. erection of silt traps, or drainage retention areas to prevent silt and sand entering drainage or watercourses must be taken • During maintenance or emergencies (e.g. burst pipe) in areas that slope toward wetlands, install sediment barriers along the edge of the maintenance activity as necessary to prevent sediment flow into wetlands

6 REHABILITATION PLAN

Rehabilitation in this document refers to the reinstatement of the temporarily disturbed areas affected by the construction or due to construction related activities, to a state that resemble the conditions prior to the disturbances.

Correspondence with the City of Johannesburg indicates a request for the PES of the wetland to be elevated from a D to a C, in line with their Catchment Management Policy. The following priorities must be awarded to rehabilitation actions to effectively elevate the status of the wetland:

- Control alien vegetation manually in the long term and ensure that indigenous species are not trampled, or removed to establish good ground cover that is able to support local biodiversity and attenuate surface water flows and stabilise soil.
- Reverse soil compaction by ripping and revegetating with indigenous vegetation. Prevent the access of pedestrians into the natural vegetation. Consider establishing walkways in a way that does not compromise the vegetation or soil of the seepage wetland.
- Rehabilitate any canalisation or erosion on the wetland by cut and fill. Long-term monitoring of alien vegetation and ensure that effective attenuation is established to prevent future erosion.
- Trap sediments and nutrients;
- Reinstate wetland habitat in the channel; and
- Aid in flood attenuation and baseflow maintenance and
- Littering should be prevented and managed in the long-term.

This wetland rehabilitation plan recognises two phases of rehabilitation:

- Phase 1: New sewerage pipes in Zandspruit, considering both underground and above ground options; and

- Phase 2: Operation, focusing on maintenance activities where work needs to be done on the pipeline upslope from the wetland

Phase 1:

The installation of pipes in the focus area will directly impact on the bed and banks of the watercourse since the footprint of the pipeline extends within and across sections of the watercourse. Furthermore, activities upslope from the watercourses, such as clearing vegetation and earthworks could potentially lead to indirect impacts on the downslope watercourse. Should impacts be observed, the rehabilitation measures set out in Table 3 below should be implemented.

Phase 2:

This phase of rehabilitation is associated with potential impacts of the operational phase of the pipeline as observed during monitoring. An example is the formation of erosion where preferential flow paths are formed. Rehabilitation measures appropriate to this phase will depend on the habitat degradation observed.

Detailed rehabilitation measures should be formulated based on the specific conditions at that time. Furthermore, maintaining the wetland at a PES class C will require intensive management of alien vegetation , littering and formation of erosion gullies. D dedicated team should be trained to regularly attend to the wetland to ensure that its integrity is maintained.

Guidance to decision making in this regard is provided in the monitoring plan in Table 4.

Table 3: Rehabilitation plan

Activity	Rehabilitation	Time frame
Planning	• Reinstatement should proceed directly after closure of the excavated areas upslope of the watercourse although revegetation may have to be postponed to the onset of the growing season • The rehabilitation plan must be made available to all parties involved. • Plan the areas to be rehabilitated in stages so as to work on one area at a time. • A dedicated team must be trained to maintain this wetland including managing alien vegetation and stabilisation of erosion during the long-term. This is essential to the maintenance of the wetland in an elevated PES class.	• Duration of rehabilitation activities relevant to areas where vegetation clearing has occurred upslope of the wetland
Access control	• All works should be supervised. • Access of pedestrians to informal footpaths through the wetland must be strictly managed to avoid trampling and littering	• Duration of rehabilitation activities • During ongoing wetland maintenance
Site preparation	• Slopes for revegetation must be cleared of alien and invasive plants. • Manual / mechanical removal of alien plants is preferred to chemical control • If herbicide must be used it should be registered for aquatic use and prior approval obtained from the Environmental Control Officer. • Planned sequence of areas to be cleared of invasive plants • Where informal footpaths have compacted soil, it should be ripped and prepared for revegetation	• Commence in early rain season (September to October)

Activity	Rehabilitation	Time frame
	• A register of the methods used, dates undertaken, as well as herbicides and dosage used must be kept and available on site. The register must also include incidents of poisoning or spillage • Soil heaps dumped on the immediate site can be used for filling areas for resloping. • The use of fertiliser should be avoided. Nutrient deficiencies are not expected to be present on the site. • Soils must be moist for revegetation activities. • Badly damaged areas should be fenced in to allow for rehabilitation to take place without further impacts on these areas	
Resloping	• In order to promote vegetation growth and establishment, the slope angle must be a maximum of 1(V):3(H). • Slope reshaping must follow the natural slope and topography of the surrounding undisturbed area and wetland to the east of the artificial channel. • Areas for resloping must be ripped or loosened to a depth of 150mm to prepare soils for revegetation and allow water penetration into the soils. • Areas earmarked for resloping must be ripped or loosened to a depth of 150mm to prepare soils for revegetation and allow water penetration into the soils. • Ripping must be done manually with hand tools. • Ripping must be done during the late dry season to prevent erosion and collapse of the banks.	• As soon as possible after closure of the trenches

Activity	Rehabilitation	Time frame
	• The original contours must be established over the pipeline. After the backfill has subsided, the contours must follow the surrounding contours to stop irregular flows, flow into surface cracks to the pipe or blockage of biotic movement	
Erosion stabilisation	• Cut and fill the eroded section of the wetland, sloping the landscape to form a gradual slope from the pipe outlet to the river. • All scoured depressions and headcuts should be targeted for sloping and stabilisation • Implement attenuation that can accommodate flows with sufficient dissipation to prevent further scouring; • During the wet season water levels at the attenuation structure should not be at full capacity, but remain at lower levels to ensure that additional runoff water can be attenuated. • Reinstate slopes to accommodate dispersed water flow into the downstream wetland; • Staked soil stabilisation material (jute or hessian geotextiles (soilsaver or GeoJute)) should be placed where a slopes steeper than 1(V):3(H) • In areas where this is not possible, or where further disturbance to the wetland will prove to be significant, a slope of no steeper than 1:2 should be achieved. • The GeoJute must be placed vertically on the slopes and overlap at the edges. It can be fastened with wooden stakes every 1m.	• Construction should ideally take place during the drier winter months, between April and September • No activities should take place in moist soils or at least 2 days after heavy rainfall •

Activity	Rehabilitation	Time frame
	• The landscaped area should include a system of structures to support raising the water table and trapping sediment so that the seepage wetland to the east and west is re-wetted and to deactivate active headcut erosion and bank collapse. Examples include weirs, drop inlets, chutes and retaining walls. However, an eco friendly approach should be taken to include structures that will become vegetated over time as the wetland achieves stability in terms of hydrology, sediment balances and vegetation. • Structures should not cause drying out of the adjacent seepage wetland by draining water towards a channel. • Structures should be safe for residents.	
Revegetation	• Areas where revegetation is required are expected to be very small. Therefore these areas can be allowed to revegetate naturally. • Where revegetation is slow or doesn't occur (as described in the monitoring plan below), active seeding of vegetation should be done. This should follow the following points: • A suitable grass mixture must be spread by hand along the extent of the slopes. • A suitable grass mixture must be spread by hand along the extent of the slopes. Species applicable for revegetation in this area include amongst others: o *Digitaria eriantha`* o *Eragrotis curvula* o *Imperata cylindrica*	• Directly after resloping and no later than November, only if natural revegetation is unsuccessful

Activity	Rehabilitation	Time frame
	○ *Panicum maximum* • Seeds must be thorough mixed before applying. • The seeds must be applied according to the required rates. • Seeds can be mixed with a spreading agent such as river sand, bran or finely sifted kraal to ensure even distribution. ○ Once complete, the seeded area must be watered and patted down gently. ○ Indigenous vegetation removed from the area must be applied over the seeded area as mulch.	

7 MONITORING PLAN

Monitoring refers to the repetitive and continued observation, measurement and evaluation of environmental criteria to follow changes over a period of time and to assess the efficiency of control measures. Monitoring in this case is relevant to areas upslope from the wetland where earthworks have led to loss of vegetation cover. The aim of monitoring is to observe that plant cover is established, either through natural revegetation, or where this is not successful, through active revegetation (Table 4).

Two phases of monitoring is recommended:

Routine Monitoring:

1. Monitoring during construction: during construction, the mitigation measures put in place to limit or negate the construction related impacts on a watercourse must be monitored, for example sediment washing from upslope cleared areas. Where these mitigation measures are not sufficient or breached, immediate corrective action should be taken.

2. Monitoring post construction phase: it is assumed that the construction will be phased and that rehabilitation is thus an ongoing effort as each phase is completed. For example, once a portion of pipeline is laid the trench is closed and rehabilitated. Monitoring post construction is important to detect any area where natural revegetation is not successful. This is an important, long-term activity that will ensure the continued maintenance of the wetland

Monitoring must be as per the above, or in compliance with the conditions stipulated in the authorization issued by the DWS with respect to this project.

Table 4: Monitoring plan

Variables	Methods	Monitoring Frequency	Indicator	Corrective Action
Vegetation cover	• On-site inspection • Monitor species cover abundance and ensure that natural species cover increase (compare to vegetation study results prior to construction) • Fixed point photography	• After re-vegetation • After the first growing season after completion of construction • Long-term monitoring to ensure the continued maintenance of the wetland	• Re-vegetation shall be considered successful if the cover of herbaceous and/or woody species is at least 80 percent of the type, density, and distribution of the vegetation in adjacent wetland areas that were not disturbed by construction	• If natural re-vegetation does not occur replanting of indigenous plants should be done at sites of concern. Refer to Table 8 for suitable species • If re-vegetation is not successful at the end of the growing season following the conclusion of the construction phase, active revegetation should be done as specified in the tables above. Continue re-vegetation efforts until wetland re-vegetation is successful
Sedimentation and erosion	• As determined by ECO • Visual observations and site inspections	• During construction • After the first growing season after completion of construction Thereafter during routine inspections • Long-term monitoring to ensure the continued maintenance of the wetland	• Excess sediment in wetlands as seen by smothered vegetation	• Cause of sedimentation should be identified and dealt with appropriately • Should sedimentation be observed to accumulate and smother vegetation, a wetland specialist should be consulted to find a suitable solution for the specific wetland / river and its plant species composition.

Variables	Methods	Monitoring Frequency	Indicator	Corrective Action
Alien Invasive Plant Species	• Monitor the emergence of alien invasive plant species in or around rehabilitated areas • On-site inspection • Fixed point photography	• After construction • After re-vegetation • Long-term monitoring to ensure the continued maintenance of the wetland	• Establishment of alien invasive plant species in rehabilitated areas or in watercourses	• Remove emergent invasive vegetation from the rehabilitated footprint as soon as it becomes apparent • Manual labour is preferred above chemical or manual removal. • Do not use herbicides or pesticides in or within 200 meters of wetland areas
Pollution control	• On-site inspection • Fixed point photography	• After construction • After re-vegetation • Long-term monitoring to ensure the continued maintenance of the wetland	• Presence or absence of pollutants including spilled sewage or littering • Illegal dumping	• Long-term management of litter by physical removal, maintenance of bins • Highlighting sewage spills to trigger immediate corrective action

8 REFERENCES

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