BASIC ASSESSMENT AND SCREENING REPORT FOR ENVIRONMENTAL AUTHORIZATION FOR THE PROPOSED MOKOPANE & SEKURUWE WATER TREATMENT SERVICES

OLIFANTS MANAGEMENT MODEL PROGRAMME BULK RAW WATER STUDY PHASE (OMMP-BRWSP)

MOKOPANE & SEKURUWE WATER TREATMENT WORKS (WTW) IN THE LIMPOPO PROVINCE OLS ASSESSMENT

Lebalelo Water Users Association (LWUA), on behalf of the Department of Water and Sanitation (DWS)

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Approval			
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1 Introduction

The intent of this report is to communicate the findings of a conceptual Obstacle Limitation Surface (OLS) assessment conducted to determine any foreseeable airspace/ civil aviation aerodrome impact posed by the new Mokopane and Sekuruwe Water Treatment Works, proposed in the Limpopo Province, to the Potgietersrus Airport (FAQR) and Shikwaru Lodge Airstrip (R081). The Mokopane Water Treatment works is approximately 5.4km North-East of the Potgietersrus Airport and 13.6km North-East of the Shikwaru Lodge Airstrip as depicted in Figure 1 below. Two alternatives for the Mokopane site is being considered in terms of environmental impact. The Mokopane site located on the steep terrain is referred to as the "**Alternative Site**", while the site on the less steep land is the "**Preferred Site"** (see Figure 2 below). The Sekuruwe site is approximately 30.7km North-North-West of the Mokopane site.

The OLS analysis conducted is based on International Civil Aviation Organization (ICAO) Annex 14 Standards and Recommended practices, the ICAO Airport Services Manual (Doc 9137) Part 6 and the SACAA Technical Standards and Guidance Material. The findings of this report are to be considered in addition to the South African Civil Aviation Authorities (SACAA) requirements.

The content of this report does not include Air Traffic Navigation Services (ATNS) requirements or radar interference considerations. The client should approach ATNS directly for the related evaluation.

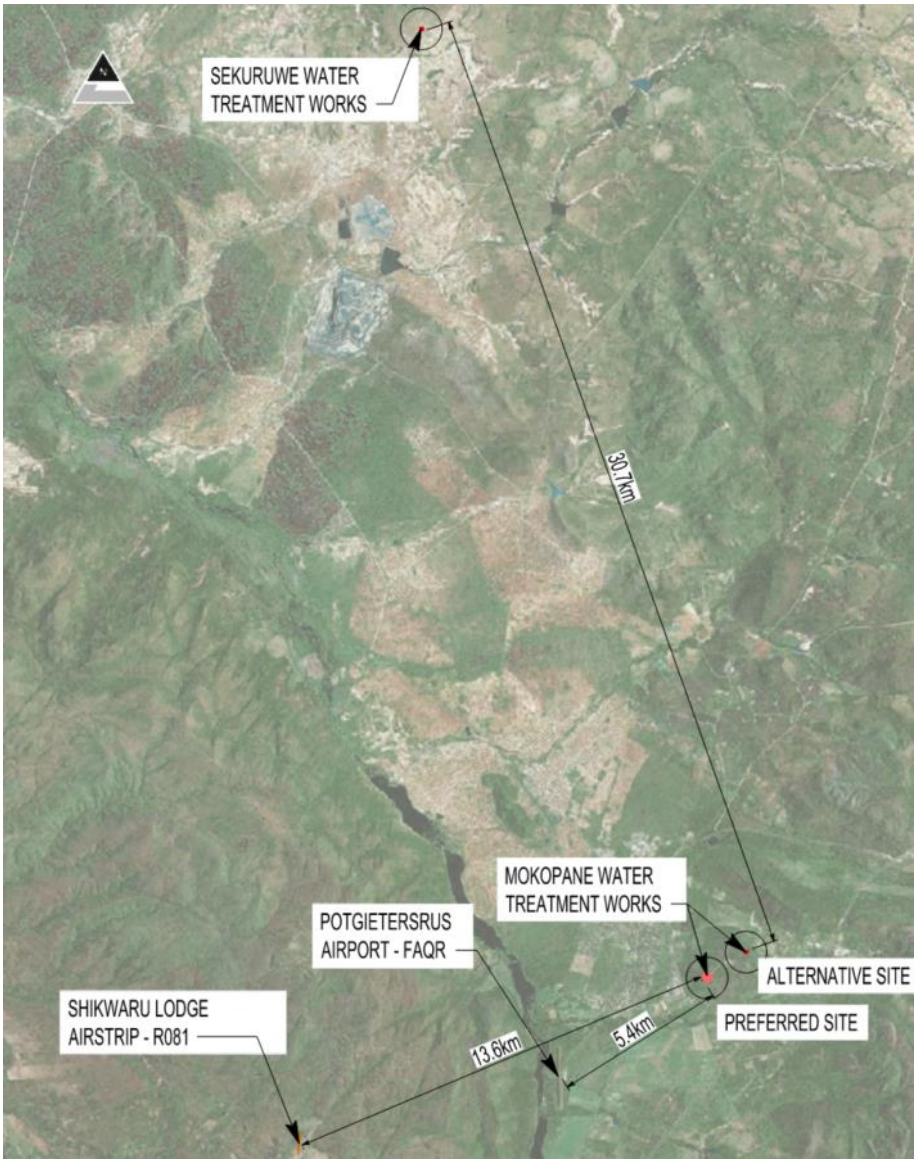


Figure 1: Locality map

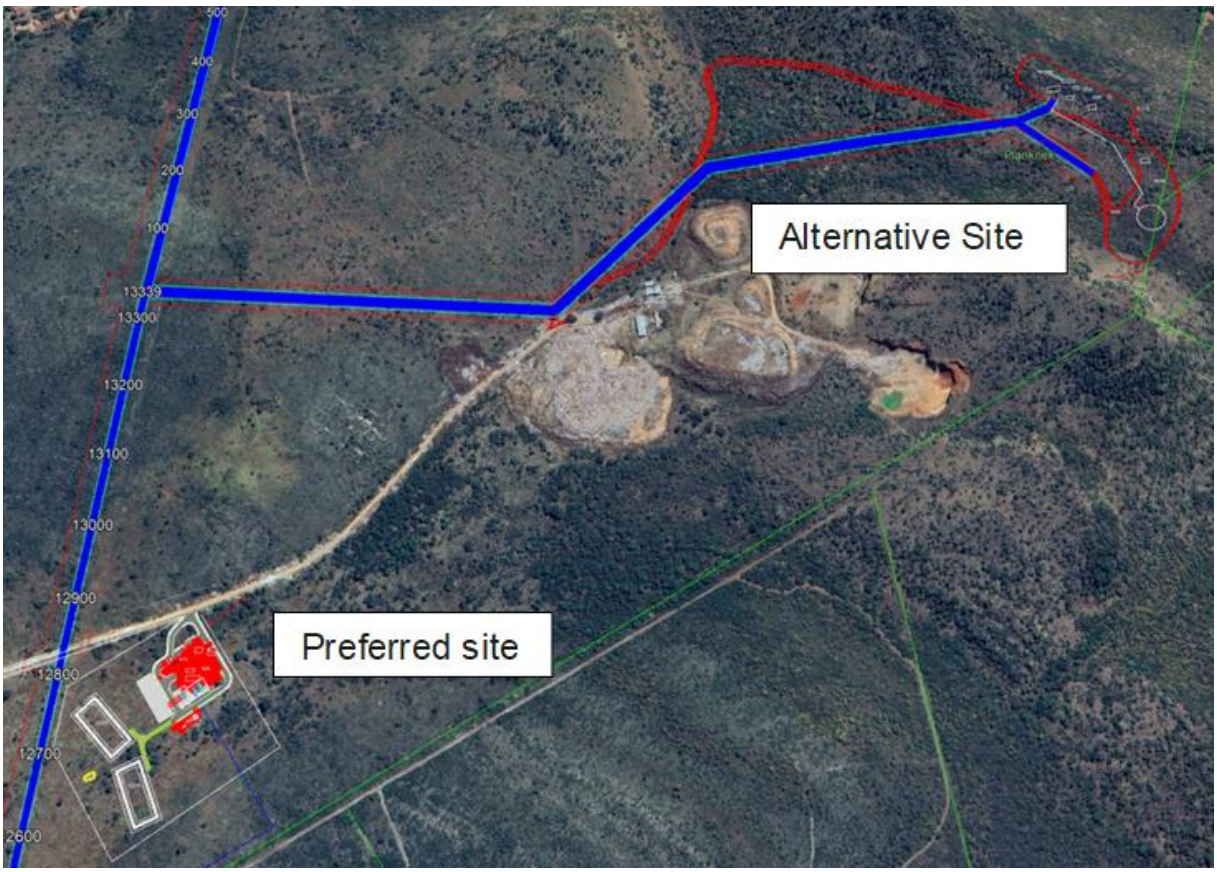


Figure 2: Mokopane Preferred and Alternative Site

2 Obstacle Limitation Surface Assessment

The OLS are series of surfaces that define the limits to which objects may project into airspace around aerodromes which are required to be maintained free from obstacles. Defining and assessing the OLS ensure that the intended aeroplane operations at the aerodromes are conducted safely and prevent the aerodromes from becoming unusable by the growth of obstacles around the aerodromes. Figure 3 illustrates the different OLS surfaces. The dimension of certain features is determined by the aircraft size for which the aerodrome is intended as well as the runway threshold positions.

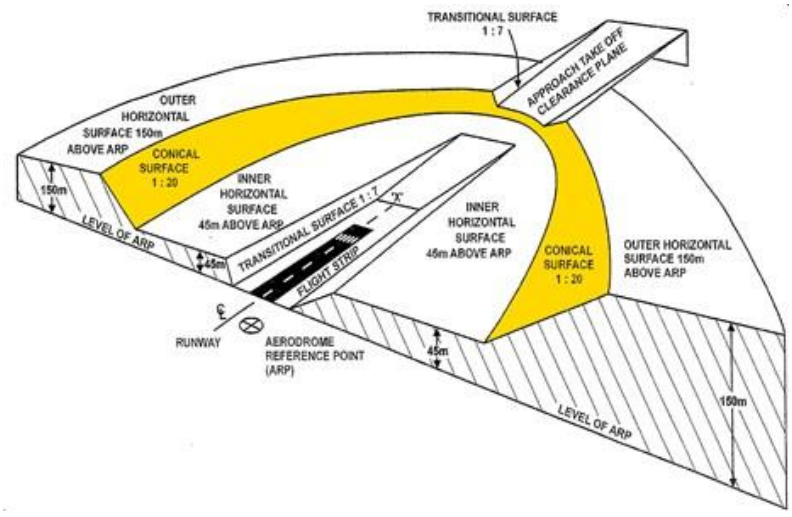


Figure 3: OLS illustration

2.1 OLS Assessment

Figure 4 illustrates the interaction of the Mokopane site with the OLS for Potgietersrus Airport and Shikwaru Lodge Airstrip.

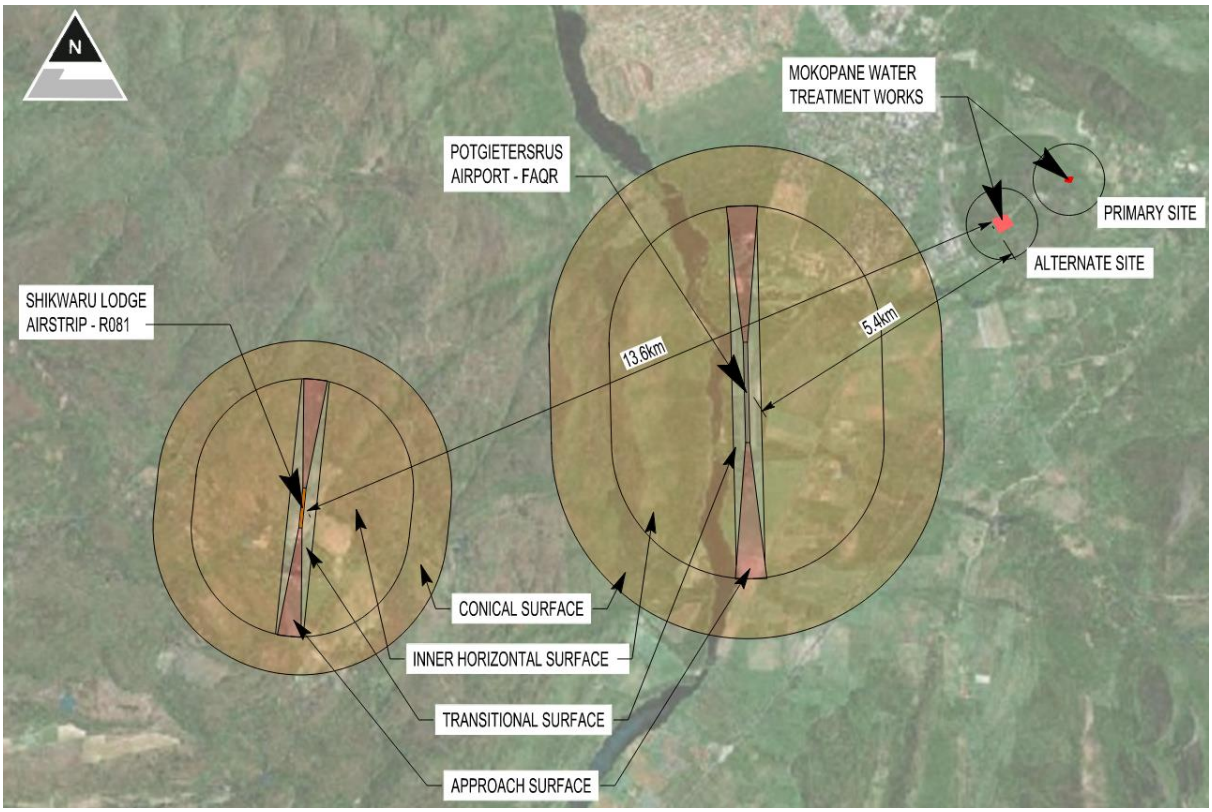


Figure 4: Potgietersrus Airport and Shikwaru Airstrip Obstacle Limitation Surfaces

2.1.1 Assumptions and Considerations

The following assumptions and considerations were applied during the OLS assessment as depicted in Table 1and

Table 2:

Table 1: Assessment assumptions and considerations (Potgietersrus Airport - FAQR)

	Assumption/Consideration	Reference
Airfield operational status	Unlicenced (Un-operational)	ATNS Airspace (RSA DATA - 13JULY2023.kmz) https://ourairports.com/airports/FAQR/
Runway length	01/19 – 1762 m	https://ourairports.com/airports/FAQR/
Runway width	15 m	Visual observation - Bing Maps
Aerodrome reference code	2A	ICAO Annex 14 Volume 1 Table 3.1
Aerodrome instrumentation category	Non-Instrument	Visual observation - Bing Maps
Aerodrome reference elevation	1067 m	https://ourairports.com/airports/FAQR/

Table 2: Assessment assumptions and considerations (Shikwaru Lodge Airstrip- R081)

	Assumption/Consideration	Reference
Airfield operational status	SACAA Registered Aerodromes (Operational)	ATNS Airspace (RSA DATA - 13JULY2023.kmz) https://shikwaru.co.za/fly-in/
Runway length	01/19 – 700 m	https://shikwaru.co.za/fly-in/ Visual observation - Bing Maps
Runway width	15 m	Visual observation - Bing Maps
Aerodrome reference code	1A	ICAO Annex 14
Aerodrome instrumentation category	Non-Instrument	Visual observation - Bing Maps
Aerodrome reference elevation	1250m	https://shikwaru.co.za/fly-in/

According to ICAO Annex 14, paragraph 4.2.1, the following surfaces are considered for a non-instrument approach runway:

- Transitional Surfaces
- Approach Surfaces
- Inner Horizontal Surface
- Conical Surface

A brief description of each surface with assessment findings is presented in the following sections. The reader is referred to ICAO Annex 14 for more information.

2.1.2 Transitional Surfaces

A complex surface along the side of the strip and part of the side of the approach surface, that slopes upwards and outwards to the inner horizontal surface. The limits of a transitional surface comprise a lower edge beginning at the intersection of the side of the approach surface with the inner horizontal surface and extending down the side of the approach surface to the inner edge of the approach surface and from there along the length of the strip parallel to the runway centre line and an upper edge located in the plane of the inner horizontal surface.

The Transitional surface slope is 20% for a code number 1 and 2, from the defined lower edge up to the Inner Horizontal Surface.

As illustrated in Figure 4, the proposed Mokopane sites is situated outside the Transitional Surfaces. Thus, no protrusions are anticipated in the Transitional Surfaces.

2.1.3 Approach and Take-off Climb Surfaces

This is an inclined plane or combination of planes, preceding the runway threshold. The limits of the approach surface comprise; an inner edge of specified length, horizontal and perpendicular to the extended centre line of the runway and located at a specified distance before the threshold, two sides originating at the ends of the inner edge and diverging uniformly at a specified rate from the extended centre line of the runway, and an outer edge parallel to the inner edge.

For the code 1 non-instrument runway conditions, the Approach surface precedes both thresholds by 30 m. The details of the surface are summarised in Table 3 below:

Table 3: Approach and take-off surface parameters

	Code 1		Code 2	
	Approach Surface	Take-Off Surface	Approach Surface	Take-Off Surface
Length of Inner Edge	60 m	60 m	80 m	80 m
Divergence (each side)	10%	10%	10%	10%
First Section Length	1600 m	1600 m	2500 m	2500 m
First Section Slope	5%	5%	4%	4%
Second Section Length	N/A	N/A	N/A	N/A
Second Section Slope	N/A	N/A	N/A	N/A
Horizontal Section Length	N/A	N/A	N/A	N/A
Horizontal Section Slope	N/A	N/A	N/A	N/A
Total length	1600 m	1600 m	2500 m	2500 m

As illustrated in Figure 4, the proposed Mokopane sites is situated outside the Approach and Take-off Climb Surfaces. Thus, no protrusions are anticipated in the Approach and Take-off Climb Surfaces.

2.1.4 Inner Horizontal Surface

The Inner Horizontal surface is a surface located in the horizontal plane at a specified height above an aerodrome, the radius of which is specified and measured from a reference point on the aerodrome. Code 1 has a radius of 2000m and code 2 a radius of 2500m. The elevation of the surface is measured 45 m from a defined elevation datum for such a purpose.

Figure 4 shows that the Mokopane sites line is situated outside the Inner Horizontal Surface. Thus, no protrusions are anticipated in the Inner Horizontal Surface.

2.1.5 Conical Surface

This surface slopes upwards and outwards from the periphery of the Inner Horizontal Surface. The upper limit is specified as a height above the Inner Horizontal Surface.

For a non-instrument approach code number 1 runway, the Conical Surface is at 35 m above the Inner Horizontal Surface. For a non-instrument approach code number 2 runway, the Conical Surface is at 55 m above the Inner Horizontal Surface. The divergence slope from the lower plane coincident with the Inner Horizontal Surface is 5% in both cases.

No protrusions to the Conical Surface are anticipated as there are no protrusions anticipated in the Inner Horizontal Surface.

2.2 Potgietersrus Airport

The conditions of the aerodrome facility identified at Potgietersrus Airport as illustrated in Figure 1 is unknown. The desktop (online) visual inspection of the facility warrants the assumption that the facility is un-operational, supported by online forums such as https://ourairports.com/airports/FAQR/. The non-operational status assumption of the facility, in addition to the distance of the facility to the proposed Mokopane sites, indicate that no airspace activities in the Obstacle Limitation Surface of the facility will be affected.

2.3 Shikwaru Lodge

The conditions of the aerodrome facility identified at Shikwaru Lodge as illustrated in Figure 1 is unknown. The visual inspection of the facility warrants the assumption that the facility is operational for fly-in guests as supported by the lodge website https://shikwaru.co.za/fly-in/. The distance of the facility to proposed Mokopane sites, indicate that no airspace activities in the Obstacle Limitation Surface of the facility will be affected.

2.4 Conclusions and Recommendations

The undertaking of this high-level concept OLS assessment indicate that the proposed Mokopane sites does not protrude the OLS of the Potgietersrus Airport nor the Shikwaru Lodge airfield.

3 Civil Aviation Compliance Assessment

3.1 Introduction

Government Notice No. 320 of 20 March 2020 stipulates the protocol for assessment and minimum report content for impacts on civil aviation installations, for activities that require environmental authorisation. The reporting requirements are associated with the level of sensitivity as identified by the National Screening Tool, which sensitivity level determines the requirement for the CAA compliance statement. A site sensitivity verification assessment must confirm or dispute the current use of the land and the environment sensitivity as identified by the screening tool.

An assessment was conducted from the information provided and from available aerial imagery to identifying possible nearby civil aviation installations with the potential of being impacted.

3.2 DFFE Screening Tool

Figure 5 and Figure **6** illustrate the planned infrastructure footprint overlaid on the civil aviation sensitivity map as generated by the DFFE screening tool for the Potgietersrus Airport and the Shikwaru Lodge airfield, respectively.

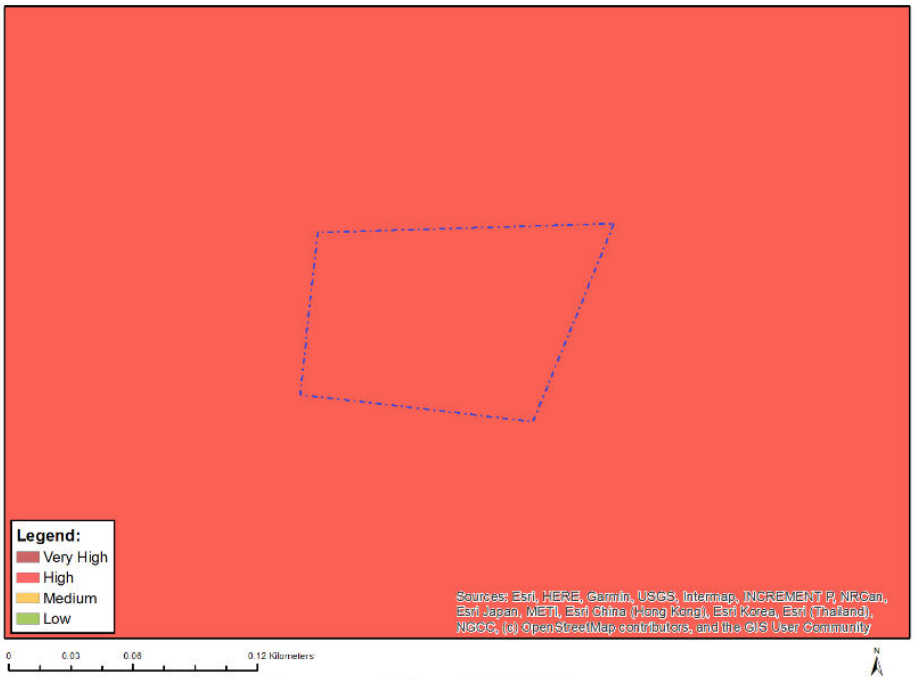
3.2.1 Mokopane WTW

Findings illustrated in Figure 5 indicate a high sensitivity feature of the planned infrastructure in relation to Potgietersrus Airport being within 8km of the aerodrome. Our analysis shows agreement with high sensitivity with the aerodrome due to the proximity.

The OLS assessment conducted however anticipates no interaction between the proposed Mokopane sites and the OLS of Potgietersrus Airport.

Table 4 shows a summary of the assessment for the Site.

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Within 8 km of other civil aviation aerodrome
High	Dangerous and restricted airspace as demarcated
Medium	Between 15 and 35 km from a civil aviation radar

Figure 5: Map of relative civil aviation theme sensitivity ***(OMMP-BRWSP - Mokopane-LWUA-2023-07-10 07-59)***

Table 4: Screening tool summary for Mokopane WTW

Sensitivity	Sensitivity Features	Mitigations of Identified Sensitivities
1. High	Within 8 km of other civil aviation aerodrome	a. The Design Report: Sekuruwe Water Treatment Works, Document ID 10691, Revision 4, states in Paragraph 5.3 that the structure will be three storeys. The proposed structure will not extend above existing structures, and therefore does not constitute a new obstacle. b. The SA AIP1 states in ENR 1.1, General Rules, paragraph 1.1.1: Minimum heights: shall be flown over built-up areas or over an open-air assembly of persons at a height less than 1 000 feet above the highest obstacle, within a radius of 2000 feet from the aircraft. There is on hazard for civil aviation.
2. High	Dangerous and restricted airspace as demarcated	The nearest restricted / dangerous airspace is the Lowveld Information sector that provides flight information services to flights above 1500 feet (457,2 meters). This airspace is situated well above the intended structure (s).
3. Medium	Between 15 and 35 km from a civil aviation radar	The nearest civil aviation radar is situated at Mokopane. The proposed structure will not pose any functional hazard to the functioning of the radar due to the limited height of the proposed structure.

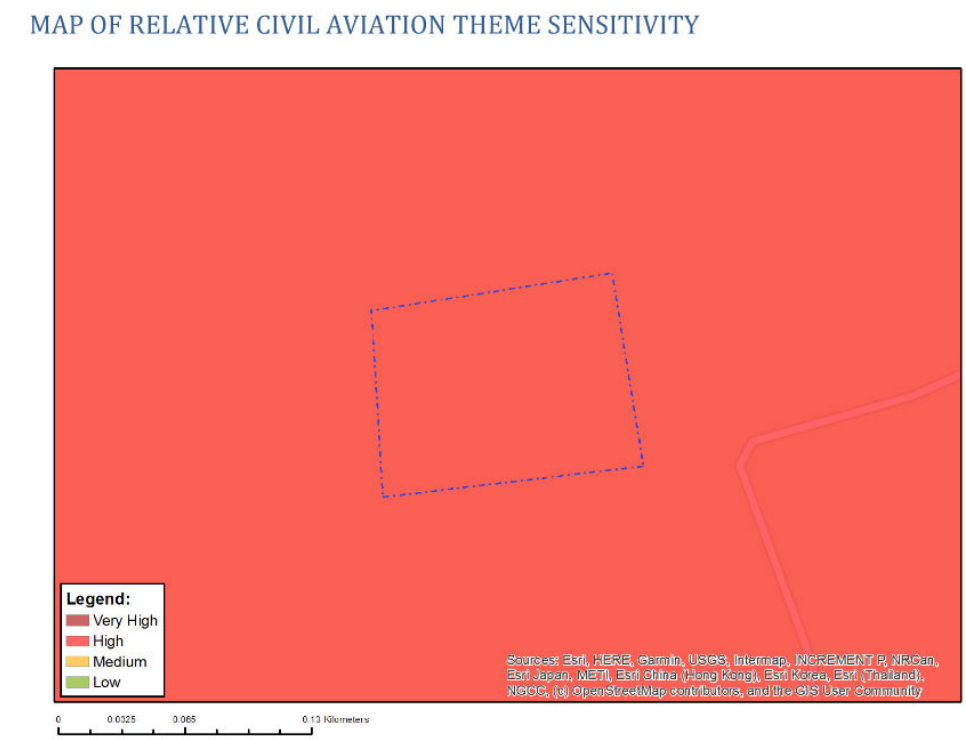
[1] SA Aeronautical Information Publication, En-Route

3.2.2 Sekuruwe WTW

Findings illustrated in Figure 6 indicate a high sensitivity noted for dangerous and restricted airspace.

Furthermore, no OLS protrusions are anticipated at Shikwaru Lodge airfield due to the distance, ~13.6 km, and the high-level OLS analysis conducted.

Table 5 shows a summary of the assessment for the Site.



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Dangerous and restricted airspace as demarcated

Figure 6**:** ***Map of relative civil aviation theme sensitivity (OMMP-BRWSP- Sekuruwe - LWUA-2023-07-10 03-59)***

Table 5: Screening tool summary for Sekuruwe WTW

Sensitivity	Sensitivity Features	Mitigations of Identified Sensitivities
High	Dangerous and restricted airspace as demarcated	The nearest restricted / dangerous airspace is the Lowveld Information sector that provides flight information services to flights above 1500 feet (457,2 meters). This airspace is situated well above the intended structure (s).

3.3 Conclusions and Recommendations

Although the planned infrastructure falls within the high sensitivity rating for the proposed site being within 8km of a civil aviation aerodrome, it is not foreseen that these civil aviation installations are impacted by the planned activities with consideration of the OLS of the Potgietersrus Airport and the Shikwaru Lodge airfield.

This analysis does not include ATNS requirements, airspace studies or radar interference considerations. If deemed necessary by the CAA, the client should approach ATNS directly for the related evaluation.

4 Qualifications and Expertise

This report was compiled and reviewed by the following professionals:

Roles	Names - Titles	Experience Summary	Qualification and Affiliations
Approver	Natanya Whitehorn - *Environmental Assessment Practitioner*	Natanya is as an environmental assessment practitioner (EAP) at Zutari. She specialises in environmental auditing and her expertise consists of risk assessment, environmental monitoring and social impact assessments (SIAs), including the study of human interaction with one another and the natural environment. She has experience in fieldwork for impact assessments, environmental monitoring as well as the public participation process (PPP), where, she has facilitated and translated at various landowner, stakeholder and public meetings and also gained experience in environmental compliance monitoring by working on a large construction project. Further significant experience includes her role as Project Manager (Environmental Lead) on various integrated environmental management (IEM) processes such as environmental impact assessments (EIAs), basic assessment reports (BARs) and the development of environmental management plans (EMPs). She has previous working experience in geo-informatics and geographic information systems (GIS). She has more than a decade of experience working with GIS, which she has gained whilst working on projects for the government, local authorities as well as the private sector. She has also gained skills in spatial representation and interpretation through her involvement in the engineering environment. Natanya has specialised in spatial analysis, data processing and mapping while her technical responsibilities include inter alia the evaluation of data, digitising, editing and converting spatial data and non-spatial data from various formats and manipulating data in Esri ArcMap with extension (XTools, ET Geowizards, ET Geotools), ArcView 3.2 and Planet GIS. She has research experience on biodiversity, natural resources management, and human developmental issues and tutoring experience at a tertiary institution in the field of Information Science (IS).	• Environmental Assessment Practitioners Association of South Africa (EAPASA) • Geo-Information Society of South Africa (GISSA) • International Association for Impact Assessment (IAIAsa) • BA (Hons) Geography • BA Geography and Environmental Management
Verifier	Zinzi Portia Xakayi – Environmental Consultant	Zinzi Portia is an environmental consultant at Zutari. She has experience in the compilation of Environmental Management Programmes (EMPrs), basic assessment reports (BARs), and environmental screening reports. She has also assisted in undertaking public participation processes for renewable energy projects in the Limpopo and Gauteng Provinces and for a Green building project in the Mpumalanga province. Zinzi has previous working experience in geo-informatics and geographic information systems (GIS). She has two years of experience working with GIS, which she has gained whilst working on projects for the private sector. she has specialised in spatial analysis, data processing and mapping while her technical responsibilities include inter alia the evaluation of data, digitising,	• Golden Key International Honour Society (GKIHS) • Geo-Information Society of South Africa (GISSA) • International Association for Impact Assessment (IAIAsa)

Roles	Names - Titles	Experience Summary	Qualification and Affiliations
		editing, and converting spatial data and non-spatial data from various formats and manipulating data in Esri ArcMap, GeoMedia and QGIS. Since joining Zutari, she has worked extensively on renewable energy projects, during which she assisted in compiling basic assessment reports, environmental management programmes and undertaking the public participation process. She is also involved in various feasibility screenings for photovoltaic (solar PV) projects in the Limpopo Province and works as an environmental compliance officer (ECO) for green buildings projects in Gauteng.	• BSc (Hons) Geography and Environmental Science • BSc Geography
Reviewer	Wynand Schoeman – *Aviation Expertise Lead*	Wynand is an aviation specialist with over 20 years of working experience. He has been involved in numerous diverse projects in South Africa, Angola, Mozambique, Lesotho, Zambia and the Philippines Islands; ranging from civil engineering infrastructure related projects to airports and urban areas, mass earthworks, water supply and reticulation, and supervision and project management for multi-level buildings. As the Airfield Lead, his role focuses on obtaining a better understanding of the complex system that forms airports. He has provided a master plan for a greenfields airport in Nigeria and various services to the Airports Company South Africa (ACSA) which included working with International Civil Aviation Organization (ICAO) Standards and Recommended Practices (SARPs), national aviation regulations and technical standards.	• Engineering Council of South Africa (ECSA) – Professional Engineer • Engineering Honours – Technology Management • Bachelor in Engineering - Civil
Author	Preston Padayachee – Airport Engineer	Preston is a civil engineer at Zutari with 4 years airport working experience. He has gained experience in airport master planning and design in South Africa, Nigeria and Rwanda. This includes geometric design of roads for windfarms and airport infrastructure according to the relevant standards. In addition, analysing the Obstacle Limitation Surfaces of airports according to the International Civil Aviation Organisation (ICAO) Annex 14.	• Engineering Council of South Africa (ECSA) – Candidate Engineer • Bachelor of Science in Engineering - Civil
External Author	Hein Reid	An air traffic controller with over 40 years of radar specialization brings unparalleled expertise to their role. They excel in deploying radar equipment, using radar-derived information, and applying their knowledge to ensure the safe and efficient flow of air traffic. Additionally, their qualifications make them well-suited for conducting environmental impact assessments in situations where radar expertise is essential to evaluate potential impacts on the defence aspect of the environment.	• CV Available upon request

Appendix A
Curriculum Vitae

Wynand Schoeman

Engineer

Qualifications
BEng (Hons) Technology Management
BEng Civil Engineering

Professional registrations
Professional Engineer, Engineering Council of South Africa (ECSA)

Specialisation
Airport and municipal infrastructure

Years in industry
22

Summary

Wynand is a professional engineer in Zutari's Tshwane office, where he has been responsible for airports planning and design for the past four years. Prior to this, he worked on civil infrastructure projects for 10 years, of which two years were spent working in Angola. He focuses on obtaining a better understanding of the complex system that forms airports. He has provided a master plan for a greenfields airport in Nigeria and various services to the Airports Company South Africa (ACSA).

He has been involved in numerous diverse projects in South Africa, Angola, Mozambique, Lesotho, Zambia and the Philippines Islands; ranging from civil engineering infrastructure related projects to airports and urban areas, mass earthworks, water supply and reticulation, and supervision and project management for multi-level buildings. He has gained valuable experience across a wide range of civil engineering infrastructure aspects and the coordination requirements between the various aspects, while working on these projects. He has also been responsible for the verification of various projects in Australia and New Zealand.

Wynand was first exposed to geometrical and infrastructure design and supervision during various projects related to car parking areas, water infrastructure, roads and runway/taxiway geometric, earthworks and stormwater management design at an airport. Subsequently, he was involved with the upgrading of airside infrastructure for aprons at two other airports. Furthermore, he was responsible for the supervision and project management of two seven-storey buildings in Angola.

His civil infrastructure experience was gained during his involvement in residential and commercial developments. He handled the water, sewage and waste components of the strategic sanitation plans for four cities in Mozambique.

Wynand obtained a Bachelor of Engineering (Honours) in Technology Management in 2002 and a Bachelor of Engineering: Civil in 2000, both from the University of Pretoria in South Africa. He is also a registered professional engineer with the Engineering Council of South Africa (ECSA).

Relevant experience

Panel for built environment consultants for the Airports Company South Africa (ACSA), South Africa, Gauteng, Airports Company South Africa (ACSA), 05/2018 - 05/2021, Project Director

Aurecon has been appointed as part of a built environment engineering panel, to deliver consulting services for the Airports Company South Africa's (ACSA's) electrical, mechanical, structural and civil projects. Aurecon's appointments as part of the panel include a traffic impact assessment (TIA) for George Airport fuel station, the Cape Town International Airport (CTIA) car rental expansion project, and the CTIA international terminal building expansion project. To date, the instructions range from provision of A380 upgrade to an international departure lounge, access road and car rental reconfiguration, water supply and underground water studies as well as concepts for a new cargo precinct and structural assessment. Responsible for project management, client liaison, project scope definition, concept designs, and technical review.

Design review and construction supervision for the New Bugesera International Airport (NBIA), Rwanda, Bugesera Airport Company Limited (BAC), 08/2017 - 03/2020, Project Director/Project Leader

Aurecon is providing design review and construction supervision services on the greenfield New Bugesera International Airport (NBIA) project, with capacity for 1.44 million passengers per year using a terminal building of approximately 30 000 m². The shape of the roof of the new terminal building

represents Rwanda and it has an undulated form. The runway and parallel taxiway length will be 3.8 km, with the Airbus A330 as design aircraft. The work involves using a drone to record the earthworks progress and using the footage to create a contour model to calculate volumes. Responsible for client liaison, design review coordination, supervising the team, and project coordination.

Rehabilitation of airside pavement at OR Tambo International Airport (ORTIA), South Africa, Gauteng, Airports Company South Africa (ACSA), 06/2012 - 10/2019, Project Director

Aurecon was appointed for a five-year period to provide professional civil engineering services for the rehabilitation of airside pavement infrastructure at OR Tambo International Airport (ORTIA). The project involved tender process and construction supervision of the 2013/2014 short-term rehabilitation project related to asphalt and concrete pavements; detailed pavement investigations and tender documentation for the short-term rehabilitation work for the airside asphalt and concrete pavements. Additional services entailed a study into paint marking and airfield ground lighting (AGL) positions for holding positions to confirm compliance with International Civil Aviation Organization (ICAO) Code F requirements. Responsible for client liaison and technical and project coordination.

Geometric reconfiguration of OR Tambo International Airport (ORTIA) cargo terminal access roads and unit load device (ULD) area, South Africa, Gauteng, Airports Company South Africa (ACSA), 10/2015 - 03/2019, Project Director

Aurecon has been appointed to, amongst others, gather and analyse data to understand the operational efficiency of the site, with a view to determine what needs to be done to address any issues in terms of lane capacity, traffic circulation, and parking and access issues. The design is currently at a conceptual stage. The project also comprises the preliminary and detailed design of a unit load device (ULD) storage area within the cargo yard. Responsible for the client liaison, project management, and design review.

Aeronautical study for the Abeokuta International Airport, Nigeria, Niger, Federal Airports Authority of Nigeria (FAAN), 01/2018 - 12/2018, Project Leader

Aurecon was appointed for the master planning, siting and conceptual master plan layout development for the new Abeokuta International Airport. The runways are designed for Code F/CAT II Instrumentation operations and the ultimate design includes two runways of 3.9 km each and cargo and passenger terminal facilities. The aprons allow for Multiple Aircraft Ramp System (MARS) configurations with a combination of contact and remote aircraft stands. The conceptual layout design includes carefully planned landside land use development together with considerations for a light rail link and freeway connections. The facilities include aviation rescue and firefighting service (ARFFS), air traffic control (ATC) and other airside support facilities. Responsible for client interaction, concept review and project coordination.

Advisory services during rehabilitation of airside infrastructure at Dundo Airport, Angola, Lunda Norte, Andrade Gutierrez Engenharia Angola, 04/2017 - 10/2018, Phase Leader

The project involved the upgrading and rehabilitation of Dundo Airport to allow for the operation of aircraft up to International Civil Aviation Organization (ICAO) Code 4D. The work included the reconstruction, extension and widening of the runway, the construction of two new link taxiways, the installation of a new stormwater drainage system, and the installation of airfield ground lighting (AGL) and precision approach path indicators (PAPIs). Aurecon was appointed to carry out audit services of the completed works, monitor the remainder of the works and investigate the compliance of the design with the relevant specifications. Responsible for review of assessment documentation for the compliance of the design of infrastructure according to ICAO Standards and Recommended Practices (SARPs).

Airside upgrading design works at the King Shaka International Airport (KSIA), South Africa, KwaZulu-Natal, BMK Consulting Engineers, 08/2017 - 08/2018, Project Director

The project involved airside upgrading design works at the King Shaka International Airport (KSIA) in Durban. Aurecon was appointed for the layout planning for Apron 2D, including stand and taxiway geometric designs as well as electrical services and airfield ground lighting (AGL) design input. Aurecon also reviewed the latest airport master plan layout in terms of spatial planning and provided the Airports Company South Africa (ACSA) with a feasibility study to assist with the A380/Code F Multiple Aircraft Ramp System (MARS) stand development planning and selection. This included multi-criteria analysis (MCA) to provide an unbiased approach to option selection. Responsible for providing certain geometric, paint marking and electrical design services to the main consultant, including liaison, technical review and project management.

Relocation of Tete Airport, Mozambique, Tete, Rio Tinto Benga Limited, 10/2012 - 10/2017, Project Director

The project comprised a site investigation study for the possible relocation of Tete Airport. This included a topographical, geotechnical and environmental assessment of three alternative sites. Responsible for project management, client liaison and team coordination.

Technical advisory services for the Mauritius Light Rapid Transit (MLRT) system, Mauritius, SMRT International Pte Ltd, 10/2012 - 08/2017, Engineer for Infrastructure Costing

The Government of Mauritius is committed to build a light rapid transit (LRT) system serving the city areas between Port Louis and Curepipe to relieve the main road arteries and to review its existing bus network with the aim of

achieving an efficient multi-modal public transport network. Aurecon was appointed, as a partner to lead agency Singapore Cooperation Enterprise (SCE) and the Singapore Mass Transit Corporation (SMRT), to provide technical advisory services for the development of the Mauritius LRT system. This included advisory services for transport and traffic planning, engineering and business case/financial planning. Responsible for the compilation of the estimated construction costs of the project.

Design for construction of a new runway at Calueque Airport, Phase 1, Angola, Cunene, Silvestre Tulumba e Investimentos (STI), 09/2016 - 05/2017, Project Leader

Aurecon was appointed for the planning, preliminary and detailed design, documentation and cost estimates for a proposed runway, taxiway and apron, capable of supporting flights using a Boeing 737 and the IL76, at Calueque Airport, including allowance for the installation of simple approach lights. The associated drainage and earthworks design, pavement layerworks, paint markings, signage and fencing were also included. Responsible for technical planning, design review and coordination, project management, and reporting.

Rehabilitation of runway, apron and taxiway at Ondangwa Airport, Namibia, Oshana Region, Namibia Airports Company (NAC), 05/2014 - 03/2017, Project Leader

Aurecon was appointed to undertake the design, tender documentation and contract supervision services for the reconstruction of 2 987 m runway at Ondangwa Airport. This included assessments of concrete and asphalt aprons and taxiways, and detailed visual assessments, material investigations and falling weight deflection (FWD) testing. The scope of work was further expanded to include the upgrading of the airport aprons as well as the major drainage systems linked hereto. Responsible for the technical review and project coordination of the geometric, stormwater, ordinary least squares (OLS) and related designs.

Construction supervision of Nova Vida Phase 2 Relançamento, Angola, Luanda, Imogestin, 03/2010 - 12/2016, Project Leader/Design Coordinator

The project involved the construction supervision for the re-launch of the Nova Vida housing project, Phase 2. This phase entailed the construction of 2 562 housing units including 168 houses, 382 villas, 30 four-storey apartment blocks, 55 six-storey apartment blocks, roads, and services in Nova Vida. Aurecon inspected works constructed by four Chinese contractors and a specialist piling contractor. The project was designed to provide military veterans with accommodation, but the scope of the project was subsequently extended to include other beneficiaries. Responsible for interacting with the town planner for the compilation of a master plan, guidance and input to water storage modellers, and pressurising, reticulation and sewer modelling. Also responsible for the technical coordination of the team designing the roads, stormwater drainage, water and sewer reticulation, and sewer and water augmentation as well as liaising with the electrical design team and Angolan staff.

Vertical alignment of the Mejametalana Airport runway, Lesotho, Lesotho Ministry of Public Works and Transport: Roads Directorate, 04/2013 - 09/2016, Project Director

Aurecon undertook the design and preparation of tender documents for the upgrading of the Mejametalana Airport. The Air Wing was operating CASA C-212 aircraft and was evaluating the procurement of a CASA CN-235 aircraft, which required the rehabilitation and upgrading of the airport airside pavements to accommodate the new aircraft. The project's primary objective was the design of the main runway for the proposed future operational requirements of the Air Force and working towards compliance of the International Civil Aviation Organization (ICAO) standards. Responsible for client liaison and project coordination.

Feasibility study for the improvement and upgrade of Selebi Phikwe Airport, Botswana, cent, Civil Aviation Authority of Botswana (CAAB), 05/2014 - 10/2015, Project Leader/Airport Planning Specialist

In 2001 a feasibility study was carried out for the Selebi Phikwe Airport to investigate future options for the airport, and to investigate their feasibility and recommend a preferred option. Aurecon was reappointed to carry out another study in 2014, which is aligned with other national strategic studies and initiatives aimed at economic diversification of the Selebi Phikwe Region, including the National Development Plan (NDP), Selebi Phikwe Polaris 2 and Regional Economic Development Strategy (REDS). Aurecon investigated the condition and structural capacity of the movement areas to accommodate the expected future traffic through field investigations as well as examined the adequacy of existing facilities such as movement areas, terminal building, control tower and water supply. A layout of the existing facilities and improvements was also developed along with a guide for the authority and other stakeholders on suitable land use around the airport. Lastly, the design of the aircraft was also examined to assess the existing navigation and surveillance equipment for suitability, as well as the identification of possible obstacles within the vicinity of the aerodromes that may render flight operations unsafe. Responsible for the assessment of airside infrastructure, including pavement conditions as inputs into updating of the master plan as well as reporting, proposing action and cost estimates.

Rehabilitation of the runway at Mahikeng Airport, South Africa, North West, North West Department of Public Works, Roads and Transport, 07/2012 - 07/2015, Project Director

The project entailed the provision of runway, taxiway and apron paint marking details as well as the conceptual design of earthworks and drainage to provide a 150 m safety area both sides of the runway. The design was carried out according to International Civil Aviation Organization (ICAO) standards. A construction cost estimate was also provided. Responsible for technical review and project management.

Upgrading of the South African Police Service's (SAPS's) K9 Academy at Roodeplaat, South Africa, Gauteng, Department of Public Works (DPW), 02/2008 - 12/2014, Project Leader

The South African Police Services (SAPS) and the Department of Public Works (DPW) initiated projects to upgrade the K9 Academy (canine school) at Roodeplaat. In order to support the upgrading and construction of buildings, infrastructure upgrades and additions were also required. The project addressed all civil infrastructure, including roads, stormwater management, earthworks platforms and noise prevention berms, water and sewer reticulation, an irrigation ring main, a pump station and sleeves. Aurecon carried out civil infrastructure design, tender documentation, construction supervision and project management. Responsible for heading the team appointed for developing designs and drawings for tender purposes and liaising with the client, the professional team and the Water Board.

Ad hoc engineering services for various Exxaro projects, South Africa, Limpopo, Exxaro Resources Limited, 06/2010 - 12/2014, Engineer/Client Representative

Aurecon was appointed to provide civil and structural engineering services on some of Exxaro's small projects on an ad hoc basis, including the design of infrastructure and assisting with project management and construction supervision. These projects included concrete structures, transport, water, geotechnical, buildings and project management related activities. The scope of each project varied, but the overall scope of services entailed design work for roads, water, sewer, stormwater management, pump stations, tailing dams and mine infrastructure; compiling specifications and bill of quantities (BoQ), and adjudication of tenders; construction supervision; project and construction management; and compiling as-built drawings on work done and signed off. Responsible for the finalisation of the access tunnel, and procurement and civil infrastructure integration at Grootegeluk Mine.

New Quattro 4th Eskom intake and related works, South Africa, Gauteng, City Power Johannesburg (SOC) Ltd, 08/2012 - 11/2014, Civil Design Engineer

The project involved the design for the construction of a new 4th Eskom intake named Quattro and related 88 kV overhead lines, the new Pennyville 88 kV switching station and Mondeor 88/11 kV substation works. Aurecon undertook feasibility studies for various load scenarios, network alternatives and financial analysis, which was necessitated by the shutting down of the Orlando power station. The studies indicated that the best solution was to construct a 400/88 kV substation with 4 x 315 MVA transformers south of the Orlando site. Responsible for liaising with electrical engineers, managing designers, and verifying drawings, quantities and specifications.

Port Harcourt township development, Phases 1 and 2, Nigeria, Niger, SVA Mauritius, 08/2012 - 10/2014, Concept Design Engineer

Aurecon was appointed for the detailed design of Phases 1 and 2 of a housing development in Port Harcourt for TAF Nigeria Homes Limited. The development includes 31 double-storey homes, servants' quarters, 38 light steel frame apartment blocks, a shopping centre, a gatehouse, a clubhouse, a golf course, service areas for electrical infrastructure, water storage and sewer treatment. The work involved the design of bulk earthworks, which was integrated into the stormwater design; as well as the design of roads and parking geometry; pavement layerworks for road and parking areas; road signage and paint markings. Responsible for civil engineering designs, reporting and costing, client liaison and liaising with electrical engineers.

Design and analysis for the Middelburg Water Reclamation Project (MWRP), South Africa, Mpumalanga, BHP Billiton Energy Coal South Africa Limited (BECSA), 05/2010 - 06/2014, Design Coordinator

The project comprised the establishment of a water treatment plant (WTP); water collection and distribution system; waste disposal system and bulk electrical supply for the treatment of water from the Middelburg Mine Services. Aurecon's services included engineering, procurement, and construction management (EPCM), project planning and project controls, option analysis and conceptual design. Responsible for the coordination of the pipeline and pump station hydraulic designs, quantity calculation and compiling bills of quantities (BoQs), and liaising with the structural designers of the pump stations.

Design of water supply infrastructure for Necuto, Angola, Cabinda, Camãe Lda, 11/2011 - 06/2014, Project Leader

The project entailed the design of an abstraction weir and pump station, pipeline to a storage facility, water treatment plant (WTP), pump stations to supply water to elevated storage and reticulation network to standpipes across the town of Necuto. The project scope entailed site visits; a topographical survey; geotechnical investigation; detailed design drawings and bills of quantities (BoQs); a storage facility; pump stations to elevated storage and the laboratory for the technician; reticulation network to connections and standpipes; electrical power supply at the treatment facility; electronic and instrumentation design for the pump stations and structural design. Responsible for conceptual layouts; coordination of hydraulic, structural, electrical and electronic designs, and liaising with Angolan staff.

Master plan for a leisure resort in Elephant Bay, Angola, Benguela, SVA Mauritius, 07/2011 - 06/2014, Civil Engineer

The project entailed the development of master plan for a leisure resort in Elephant Bay. Responsible for assessing site conditions; providing input and attending meetings with the client, architect and landscaper regarding the civil infrastructure.

Featherwood Residential Estate, South Africa, Gauteng, Featherwood Estate, 08/2004 - 05/2014, Team Leader

The project entailed civil engineering infrastructure for residential retirement development with 152 units in the east of Pretoria. Responsible for the provision of construction drawings for the fourth stage of development, including calculation of quantities.

Audit of the Principe International Airport runway's International Civil Aviation Organization (ICAO) compliance, São Tomé and Príncipe, HBD STP - Investimentos Turísticos, Unipessoal, Lda, 10/2010 - 05/2014, Project Director

Aurecon investigated possible upgrades to the airport to enable the safe landing and take-off of a Bombardier Global Express as per International Civil Aviation Organization (ICAO) standards. The project also entailed an investigation of the upgrading of 25 km of roads on the island. Aurecon also assisted with the logistics for the delivery of equipment to the island; as well as the procurement of temporary houses and the transportation of farming and other equipment to the island. A study to investigate the upgrading of an existing port/offloading facility was also conducted. Responsible for client liaison, project management, and the design review.

Nova Vida housing development, Phase II, Angola, Luanda, Ministério das Obras Públicas (MINOP) Projecto Nova Vida, 11/2006 - 04/2014, Project Leader

Phase 2 of the Nova Vida housing development consisted of two distinct contracts, namely housing and infrastructure. The housing portion constructed 1 862 units, and the infrastructure contract included a variety of aspects such as 22 km of completely new asphalt roads; a stormwater drainage system; 18.3 km sewerage network; a 4 Ml concrete-activated sludge wastewater treatment works (WWTW); 17.8km of water reticulation lines and electrical installations. Responsible for managing the team of designers and draughtspersons for the provision of revised designs and drawings related to civil engineering infrastructure, and liaising with Angolan staff.

Design package DD6A for the Gautrain Rapid Rail Link (GRRL), South Africa, Gauteng, Bombela Civils Joint Venture, 07/2006 - 03/2014, Team Leader

The Gautrain Rapid Rail Link is a dedicated light rail line that supports the operation of a transit system capable of operating at speeds of 170 km/h. The 80 km high-speed rail link from central Johannesburg (Park Station) to Hatfield includes 18 km rail in a tunnel, resulting in 10 stations with parking facilities. Aurecon undertook the concept and detailed design of an 8.6 km section of railway, including the detailed design of Viaduct V5c and the associated Centurion Station. Most of the Centurion Station buildings are located underneath the viaduct with elevators providing access to the station platforms above. Prior to the design Aurecon was involved in route assessment and the assessment of station access roads and existing services along the rail route. In a separate contract Aurecon completed detailed design of the Marlboro Station, Rhodesfield Station and OR Tambo International Airport (ORTIA) Station. Responsible for the design of relocation routes for sewer infrastructure, issuing of drawings and liaising with the client.

Project management for King Mswati III International Airport, Swaziland, Swaziland Government - Ministry of Economic Planning and Development, 05/2010 - 03/2014, Project Leader

Aurecon was appointed as project managers to finalise the infrastructure construction process for the King Mswati III International Airport, originally named Sikhuphe International Airport. Aurecon's role was to manage the seven packages for the development of the airport behalf of the client. The scope of work included a review of the master plan previously developed by others, focusing on the suitability of existing infrastructure based on the expected air traffic and passengers. Responsible for coordination and assessment.

Rehabilitation and upgrading of Namibe Airport, Angola, Namibe, Construtora Norberto Odebrecht, 03/2013 - 12/2013, Design Engineer

Aurecon was appointed to undertake the evaluation and detailed design for the rehabilitation and upgrading of Namibe Airport airside movements and airfield ground lighting (AGL). The objective was to provide the client with an evaluation report with technical assessment of the conditions of the airfield and a detailed design and engineering solution for the rehabilitation and upgrading of the airfield in accordance with the standards and recommendations of the International Civil Aviation Organization (ICAO). The airport permits the aircraft B737-700 to serve the airport. Responsible for the design review and project coordination.

Vergunning Housing Development, South Africa, Limpopo, SeCo Construction Project Managers, 10/2010 - 02/2013, Civil Engineer

This was an affordable housing project on a 126 ha stand in Polokwane. Responsible for guiding and approving the compilation of the layout drawings and writing the engineering services report with estimates.

Alterations to the airside aprons and taxiways at OR Tambo International Airport (ORTIA), South Africa, Gauteng, Airports Company South Africa (ACSA), 06/1998 - 06/2012, Design Engineer

Aurecon was appointed for the project management of the Charlie and Lima Taxiways as well as the Echo Apron for the OR Tambo International Airport (ORTIA). The project's main aim was to create aircraft stands that can accommodate the Airbus A380 Passenger Aircraft. Six A380 aircraft stands were constructed as well as five new

B747-400 aircraft stands. The project was undertaken in phases and certain enablement work was undertaken to facilitate construction. This work included the construction of Lima Taxiway and the extension of Charlie Taxiway, the construction of new vehicle parking areas and the relocation of existing security fences. Responsible for geometric and earthworks design using ModelMaker software.

Expansion of Liqhobong Diamond Mine, Lesotho, Liqhobong Mining Development Company (Pty) Ltd (LMDC), 02/2008 - 06/2012, Project Leader

The project entailed the concept study for the upgrading of the supporting infrastructure at the Liqhobong Diamond Mine. Due to the challenging topography (mountainous), access roads, terraces and ponds/dams required careful study to assure safety, constructability and fitness for purpose. The infrastructure furthermore had to accommodate other disciplines such as the tailings facility, the bulk materials handling (BMH), and existing operations while under construction. Responsible for attending professional team workshops and meetings, conceptual infrastructure layouts, arranging an aerial survey and liaising with the access road designer.

Infrastructure engineering services for the Euphoria Golf Estate and Hydro development, South Africa, Limpopo, Euphoria Gold Estate, 08/2004 - 05/2012, Project Leader

The Euphoria Golf Estate and Hydro, a greenfields development in the heart of a cluster of surrounding golf estates in Limpopo. The 18-hole championship golf course is the first golf course in Africa to be designed by Annika Sorenstam. The estate is also distinguished by a cableway that links the club house to the mountain estate and Sundowner Deck Restaurant. Aurecon provided the full spectrum of infrastructure engineering services for this project, inclusive of bulk earthworks, stormwater management, roads, water, sewage and electrical services. Responsible for the design of the parking area and the road to the maintenance facility and the close-out of the construction stage.

Tourism resort master plan for Northern Mozambique, Mozambique, Arco Norte Tourism Development Company (ANTDC)/ Pattichides & Partners, 10/2009 - 05/2012, Design Coordinator

Aurecon was appointed to provide high-level conceptual planning for the development of an integrated tourism resort master plan with the aim of enabling the development of an internationally competitive tourism industry in Mozambique. The project was implemented in two phases; Phase 1 addressed the overall strategic context and resort development master plan, while Phase 2 addressed the detailed master plans, business plans and development briefs for three selected projects. Responsible for the assessment of focus areas based on previous reports and attending meetings with the client and architect.

Glevera Retirement Haven, South Africa, Gauteng, MEGA, 02/2008 - 04/2012, Team Leader

The project concerned the Glevera Retirement Haven consisting of three separate buildings, each with three levels, in Waterkloof. Responsible for revising of parking area layouts and levels and the sewer and stormwater reticulation around the buildings.

Freedom Park Development, Phases 1-3, South Africa, Gauteng, Freedom Park Trust, 02/2003 - 12/2011, Design Engineer

The project entailed the detailed design and contract documentation for the 52ha Freedom Park Development. Aurecon was appointed to assist with the design of bulk infrastructure comprising roads and parking areas, water and sewer connections and reticulation and electrical connections and reticulation. The access road through the Salvokop Township was also upgraded. Additional work carried out included the rehabilitation of a small Kaolin Mine on the Freedom Park site, including the securing of the site to prevent illegal ingress, while stormwater management was also undertaken. Responsible for the design of the car park areas and adjoining portions of the ring road, liaising with the design team and joint venture (JV) partners and ensuring that the existing indigenous flora was taken into consideration.

Structural design and pump specifications for the Itsoseng bulk water supply project, South Africa, North West, Ngaka Modiri Molema District Municipality (NMMDM), 06/2009 - 10/2011, Project Leader

The water reservoir in Itsoseng had become structurally unsound and a new water reservoir, tower and pump station were constructed in order to replace the existing facility. Aurecon was contracted for the structural designs and for the pump specifications for the installation of the pump and the connecting pipelines. Responsible for client liaison and attending meetings, head of team for the updating of the design drawings and quantities and liaising with structural engineers.

Design, project management and site supervision of the Aparthotel Baía, Angola, Luanda, Ouse Investments, 02/2005 - 06/2011, Contract Manager

The Aparthotel Baía in Luanda's central business district (CBD) consists of numerous small apartments, 57 suites, and parking for 20 vehicles. The hotel's surface area is 4 800m² and the building consists of one basement and eight storeys. Aurecon was appointed for the design review, project management and site supervision of this project. Due to unique challenges faced in Luanda, Aurecon had to allow for the provision of a power generator, water tanks and water pumps in the design to enable the hotel to provide its own water and power. Responsible for the construction supervision and project management, liaising with the client, and cost control.

Preliminary design for expansions at the western boundary of Nova Vida, Angola, Luanda, Ministério das Obras Públicas (MINOP), 01/2009 - 07/2010, Project Leader

The project entailed consultancy services for the preparation of a report on the factors influencing the proposed new extension on the Nova Vida township; making recommendations on the upgrading and improvements to existing infrastructure and the preparation of a provisional layout plan for the extensions. Additionally, the objectives also included the preparation of an initial cost estimate for budget purposes and the finalisation of the terms of reference (TOR) for the detailed design phase. Responsible for conceptual civil infrastructure layouts and inputs for the town plan, and liaising with the electrical engineers and Angolan staff.

Civil and electrical engineering infrastructure for Louwlardia Extensions 11, 22, 46 and 47, South Africa, Gauteng, Improvon, 05/2006 - 05/2010, Project Leader

The project involved civil and electrical engineering infrastructure for four commercial stands in the Centurion area. Responsible for the completion of the construction stage.

Shoprite Housing Project, Angola, Luanda, Shoprite Checkers, 01/2004 - 12/2009, Supervisor

The project entailed construction supervision of the first 13 houses out of the 56 for Shoprite staff. Aurecon's scope of services included infrastructure design, project management and contract supervision for the housing, pump station, substation, stormwater and sewerage systems and roads. Responsible for the inspections of house construction and liaising with the client and the architect.

Upgrading of the Riverview wastewater treatment works (WWTW), South Africa, Mpumalanga, eMalahleni Local Municipality, 10/2008 - 10/2009, Project Leader

Aurecon was appointed for the documentation and site supervision for the upgrading of the Riverview wastewater treatment works (WWTW) by retrofitting equipment with new and refurbished equipment to ensure that the works is functioning at full capacity. The project scope included work on the inlet screen, primary settling tanks, a sludge pump station, aerators, bio-filters, final clarifiers, a return pump station and a humus pump station. Responsible for close-out of the construction stage of the project.

Sanitation plans for Xai-Xai, Chokwe, Inhambane and Maxixe, Mozambique, National Directorate of Water/Direcção Nacional de Águas (DNA), 07/2008 - 03/2009, Team Leader

Aurecon was appointed for the provision of consultancy services for strategic sanitation plans for Xai-Xai, Chokwé, Inhambane and Maxixe to provide an inventory of existing sanitation infrastructures as well as to define a strategy for intervention. These strategic sanitation plans defined the investments needed to develop sanitation infrastructure, the extension of water supply systems and the necessary financial and institution/management arrangements to ensure the sustainability of the respective investments. Responsible for site visits; the assessment of water, sewer, stormwater and waste infrastructure; conceptual sewer reticulation and pumping systems; the provision of estimates for the economic model; and report writing.

Housing development project in Cabinda, Caio Verde, Angola, Cabinda, Ondjwo Yetu, 06/2005 - 02/2009, Project Leader

The aim of the project was to provide housing to an increasing number of locals and expats employed in the oil industry in Cabinda. Aurecon was involved from the project conceptualisation and master planning stage, including the execution of all the preliminary investigations such as geotechnical, geo-hydrological and environmental studies. Aurecon was also involved in the detailed engineering design of the first phase of the project, encompassing water, sewer, roads, stormwater and electrical services. Responsible for heading the team appointed for compiling final tender drawings and documentation for civil engineering infrastructure.

Expansion of Dwarsrivier Chrome Mine's north pit, South Africa, Mpumalanga, Assmang, 06/2008 - 10/2008, Project Leader

The project entailed the expansion of Dwarsrivier Chrome Mine's north pit through the provision of stormwater drainage and declining road and electrical supply for underground mining activity. Responsible for site visits, liaising with the project manager, and the provision of stormwater protection details and the decline road longitudinal section.

Conceptual and detailed design for the Moatize Coal Project, Mozambique, Tete, Vale Moçambique Limitada, 03/2008 - 10/2008, Design Coordinator

Aurecon was appointed for the conceptual and detailed design of the mine infrastructure components for the Moatize Coal Mine project, including maintenance and administration facilities, conveyors, bulk water and electrical supply, new access roads, a water treatment plant (WTP), a railway yard and coal loading facilities. The appointment also included geotechnical investigations and project management. Subsequently, Aurecon provided construction coordination support on site and a soils and concrete testing laboratory during construction of the mine. Responsible for responding to information requests relating to water pipe systems, including the impact of changes to the primary crusher dust control system.

Design, project management and site supervision for the Edifício Maianga, Angola, Luanda, Ouse Investments, 01/2005 - 12/2007, Contract Manager

Aurecon was appointed for the design, project management and site supervision of the Edifício Maianga, which consists of one basement and seven storeys and includes retail space, offices and apartments. Due to unique challenges faced in Angola, Aurecon also had to allow for the provision of a power generator, water tanks and water pumps in the design to enable the development to provide its own water and power. Responsible for the construction supervision and project management, liaising with the client, and cost control.

Construction of the Sunrise View Retirement Estate, South Africa, Gauteng, MEGA, 10/2007 - 12/2007, Team Leader

The project, carried out in multiple stages, involved the construction of the residential retirement development in Elarduspark, Pretoria. Responsible for the updating and provision of construction drawings for the remaining eight stands.

Façade engineering services for the Torres Atlantico building, Angola, Luanda, Pre-Plan, 05/2005 - 11/2007, Supervisor

Aurecon was appointed to provide façade engineering services for the new head office development for ExxonMobil, consisting of a commercial building of 20 storeys and an apartment complex of 10 storeys, both buildings linked by a four-level parking garage. Aurecon's role entailed the façade engineering for the curtain wall and aluminium cladding sub-contracting. Responsible for the inspection and supervision of the installation of the façade, and liaising with the designer.

Construction of the Lobatse-Kanye bypass roads, Botswana, South, Ministry of Works and Transport - Roads Department, 07/2001 - 03/2005, Design Engineer

The project consisted of the provision of bypasses on the Trans-Kgalagadi road for the towns of Lobatse (10 km) and Kanye (16.5 km). The new roads consisted of one carriageway of a future dual carriageway road. The cross section is typically two surfaced lanes of with a width of 3.7 m each and 1.5 m-wide surfaced shoulders. On the Lobatse section, climbing lanes were also constructed. A major road-over-river bridge was included, as well as several major drainage structures. Responsible for determining the expected runoff quantities and the design of culverts for the roads.

Nova Vida township development, Phase I, Angola, Luanda, Ministério das Obras Públicas (MINOP) Projecto Nova Vida, 08/2000 - 01/2005, Civil Engineer

Phase 1 of the Nova Vida housing project involved the design and construction of 1 600 flats, 500 three-bedroom houses and 300 four-bedroom houses. Apart from housing, the infrastructure facilities also provided for future community facilities, parks, schools, a university, clinics, shopping centres, retail complex, office accommodation, light industrial stands, churches and town management offices. A primary school, police station, convention centre and sport centre were constructed under separate contracts during Phase 1. Aurecon's role entailed the provision of a contract management and construction monitoring service and to supply resident engineers.

Upgrading of the apron and terminal building at Lanseria International Airport, South Africa, Gauteng, Lanseria International Airport, 01/2000 - 07/2004, Design Engineer/Supervisor

The project entailed earthworks, roads and civil engineering services for new terminal building and extension to apron parking areas for the aircraft at Lanseria International Airport. Responsible for part-time site supervision of the construction of airport infrastructure, including services for new building and asphalt and concrete pavement areas. Also responsible for the coordination and design of certain final drawings.

Upgrading of the Alpha taxiway at Lanseria International Airport, South Africa, Gauteng, Lanseria International Airport, 02/2003 - 07/2004, Design Engineer

The project entailed a 1 000 m upgrade of the taxiway from a 7.5 m width to 15 m width, with 5 m surfaced shoulders and an International Civil Aviation Organization (ICAO) compliant taxiway strip. Responsible for the geometric and drainage design of earthworks, modelling, and the calculation of quantities.

Upgrading of Livingstone Airport, Zambia, National Airports Corporation Ltd (NACL), 01/2003 - 06/2004, Assistant Design Engineer

Aurecon was appointed for the upgrading of electrical reticulation at Livingstone Airport. The upgrading included improvements to the runway lighting, apron elimination, emergency power supply and electrical reticulation. Responsible for the geometric design, drainage calculations, contract documentation, calculation of quantities, and cost estimates.

Construction of a car park extension at Lanseria Airport, South Africa, Gauteng, Lanseria International Airport, 03/2003 - 12/2003, Design Engineer

Lanseria Airport completed the construction of a car park area opposite the terminal building towards the end of 2000. Aurecon was appointed the geometric and pavement design of an extension to the existing car park, following indications that additional capacity was needed. The extension was constructed in two phases, with the first phase providing an additional 350 parking areas. Responsible for the coordination and design of the parking area layout and geometry as well as for the supervision of the mass earthworks contract for the construction of additional parking bays, which entailed moving 400 000 m^3 of earth material.

Cut-off trench at OR Tambo International Airport (ORTIA), South Africa, Gauteng, Airports Company South Africa (ACSA), 07/2002 - 04/2003, Project Leader

Aurecon was appointed for the preliminary and detailed design as well as conducting surveys for a cut-off trench at the OR Tambo International Airport (ORTIA). As part of the remedial work on fuel spillages at the Delta Apron, two methods were considered by the Airports Company South Africa (ACSA). These methods included a cut-off trench to prevent flow into residential areas and a vacuum enhanced recovery (VER) system. Responsible for the design of the subsurface drain and the compilation of tender documentation.

Apron area, mass earthworks and appurtenant works for new Execujet facility, South Africa, Gauteng, Execujet South Africa, 01/2001 - 01/2002, Design Engineer

The project entailed the addition of a taxiway, apron and services to the office block and hangar at the Execujet facility, consisting of an office block, hangars, an apron and parking areas. Responsible for the coordination and design of certain final design drawings, and part-time supervision of the construction of civil works.

Western Cape visual calibration sections, South Africa, Western Cape, Provincial Administration of the Western Cape (PAWC), 01/1999 - 01/2000, Technician

The project involved visual condition assessments of pre-determined sections to assess management model calibrations. Responsible for assisting with the visual evaluation of the calibration sections in.

Philippines road centreline survey, Philippines, World Bank/Department of Public Works and Highways, 01/1999 - 01/2000, Technician

The project involved the collection of road centreline information using video, global positioning system (GPS), computer and specialised equipment of the entire national road network. Responsible for assisting with the installation, calibration and operation of survey equipment in vehicles and the processing of video, GPS and survey data.

Eastern Cape road centreline survey, South Africa, Eastern Cape, Eastern Cape Provincial Administration (ECPA), 01/2000 - Click or tap to enter a date.**, Technician**

The project involved the collection of road centreline information using video, global positioning system (GPS), computer and specialised equipment. Responsible for assisting with the installation, calibration and operation of equipment in the vehicles for surveying purposes.

Design of various roads in Lesotho, Lesotho, Government of the Kingdom of Lesotho (GOL), 01/2001 - Click or tap to enter a date.**, Design Engineer**

The project entailed the design of the Mohale feeder roads and the Mantoyane-Thaba Kholo plateau in Lesotho. Responsible for determining the expected run-off quantities, and the design of culverts for the roads.

Upgrade of airside at Lanseria International Airport, South Africa, Gauteng, Lanseria International Airport, 01/2003 - Click or tap to enter a date.**, Design Engineer**

The project entailed the design of the final levels for the mass earthworks contract to comply with requirements for the International Civil Aviation Organization (ICAO) Category 3C non-instrument main runway, the design of related stormwater and sewer upgrading, the calculation of quantities, and liaising with the client regarding cost estimates prior to design work. Responsible for geometric design for the upgrading of the runway and taxiway infrastructure.

Steel fuel line at Johannesburg International Airport (JIA), South Africa, Gauteng, Airports Company South Africa (ACSA), 01/2002 - Click or tap to enter a date.**, Documentation Engineer**

The project entailed a 400 mm steel fuel line for the Delta Apron at the airport, now known as the OR Tambo International Airport (ORTIA). Responsible for the compilation of tender documents, and the calculation of quantities.

Natanya Whitehorn

Environmental Practitioner

Qualifications
BA (Hons) Geography
BA Geography and Environmental Management

Professional registrations
Environmental Assessment Practitioner (EAP), Environmental Assessment Practitioners Association of South Africa (EAPASA)
Member, Geo-Information Society of South Africa (GISSA)
Member, International Association of Impact Assessment South Africa (IAIAsa)

Specialisation
Environmental management and geographic information systems (GIS)

Years in industry
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Summary

Natanya is as an environmental assessment practitioner (EAP) at Zutari. She specialises in environmental auditing and her expertise consists of risk assessment, environmental monitoring and social impact assessments (SIAs), including the study of human interaction with one another and the natural environment. She has experience in fieldwork for impact assessments, environmental monitoring as well as the public participation process (PPP), where, she has facilitated and translated at various landowner, stakeholder and public meetings and also gained experience in environmental compliance monitoring by working on a large construction project. Further significant experience includes her role as Project Manager (Environmental Lead) on various integrated environmental management (IEM) processes such as environmental impact assessments (EIAs), basic assessment reports (BARs) and the development of environmental management plans (EMPs).

She has previous working experience in geo-informatics and geographic information systems (GIS). She has more than a decade of experience working with GIS, which she has gained whilst working on projects for the government, local authorities as well as the private sector. She has also gained skills in spatial representation and interpretation through her involvement in the engineering environment. Natanya has specialised in spatial analysis, data processing and mapping while her technical responsibilities include inter alia the evaluation of data, digitising, editing and converting spatial data and non-spatial data from various formats and manipulating data in Esri ArcMap with extension (XTools, ET Geowizards, ET Geotools), ArcView 3.2 and Planet GIS. She has research experience on biodiversity, natural resources management, and human developmental issues and tutoring experience at a tertiary institution in the field of Information Science (IS).

Natanya obtained a Bachelor's degree (Honours) in Geography, majoring in Geo-Informatics and Strategic Environmental Planning, form the University of Johannesburg, South Africa, in 2002. She has also completed a South African Auditor and Training Certification Authority (SAATCA) Certified ISO 14001 Lead Auditors Course. She is a member of the International Association for Impact Assessment South Africa (IAIAsa) as well as the Geo-Information Society of South Africa (GISSA).

Relevant experience

God's Window Skywalk, , Motsamay Tourism Group (Pty) Ltd, 08/2021 - 12/2024, Project Manager/Environmental Lead

Zutari was appointed to conduct an environmental impact assessment (EIA) and water use licence application (WULA) for the proposed construction of a skywalk and skybridge at God's Window in the Mpumalanga Province. These services are to ensure compliance with the National Environmental Management Act (Act No. 107 of 1998) (NEMA), National Water Act, 1998, as well as other associated or required environmental authorisations. Responsible for overall project management, including writing the inception, scoping, EIA and EMP reports. Also responsible for managing all specialists and sub-contractors as well as overall financial management of the environmental component of the project.

Environmental impact assessment (EIA) and water use licence application (WULA) for the Seriti Kriel LifeX Project – beneficiation plant, opencast mining and dragline walk, , Seriti Coal (Pty) Ltd, 04/2021 - 12/2022, Project Manager/Environmental Lead

Seriti Coal has a contract to supply Kriel Power Station with 8.5 Mtpa of coal through a contract which has been extended to 2039. To best service this contract Seriti commissioned a trade-off study into transporting coal by rail, overland conveyor and haul truck. This study was revisited with the exclusion of the rail option in the report mentioned above in which additional information such as the existence of a haul fleet and tip was included. Both

Kriel Colliery and Kriel Power Station are situated near the town of Kriel in Mpumalanga. Zutari is the engineering consultants on the project reviewing the trade off study. Zutari was also appointed to conduct an environmental impact assessment (EIA) and water use licence application (WULA) for the proposed construction of a beneficiation plant at the Seriti Kriel opencast coal mine, proposed opencast mining of Pits 11 and 13 as well as the proposed dragline relocation walk at the Seriti Kriel opencast coal mine. These services are to ensure compliance with the National Environmental Management Act (Act No. 107 of 1998) (NEMA), National Water Act, 1998, as well as other associated or required environmental authorisations. Responsible for overall project management, including writing the inception, scoping, EIA and EMP reports. Also responsible for managing all specialists and sub-contractors as well as overall financial management of the environmental component of the project.

Master plan of the feeder roads and bridges – Polihali reservoir, LHWP Phase II, , Lesotho Highlands Development Authority (LHDA), 05/2021 - 10/2022, Environmental and Geospatial Lead

In order to investigate the impact of the inundation of the Polihali reservoir, and plan for mitigation measures to ensure that accessibility is restored to the effected communities, the Lesotho Highlands Development Authority (LHDA) appointed Zutari to develop a master plan of the feeder roads and bridges for the Polihali reservoir. The impounding of the Polihali reservoir will inundate the valleys of the Senqu, Mabunyaneng, Khubelu, Sehonghong and Mokhotlong rivers over considerable distances. A number of existing roads and tracks will be permanently submerged and shops, schools, other community services and agricultural activities will no longer be accessible. Responsible for coordinating all inputs into the infrastructure inventory and final options to be considered during the final master plan. Also responsible for all mapping relating to natural and social environmental sensitivities and features and their relevance feeding into the master plan.

Environmental impact assessment (EIA) and water use licence application (WULA) for Bierspruit Opencast Mining Project, South Africa, Limpopo, Anglo American Rustenburg Platinum Mines, 02/2019 - 05/2020, Project Manager/Environmental Specialist

Zutari was appointed to conduct an environmental impact assessment (EIA) and water use licence application (WULA) for the proposed Bierspruit Opencast development at the Amandelbult Mine complex near Thabazimbi in the Limpopo Province. These services are to ensure compliance with the National Environmental Management Act (Act No. 107 of 1998) (NEMA), National Water Act, 1998, as well as other associated or required environmental authorisations. Responsible for overall project management, including writing the inception and ESIA reports. Also responsible for managing all specialists and sub-contractors as well as overall financial management of the project.

Environmental and social impact assessment and resettlement action plan for Zones 2 and 3 of the Lesotho Lowlands Bulk Water Supply Scheme, Lesotho, Lesotho Water Commission, 06/2018 - 03/2019, Project Manager/Environmental Specialist

Zutari was appointed as an independent consulting firm to undertake the environmental and social impact assessment (ESIA) and resettlement action plan (RAP) for the proposed Zone 2 and 3 of the Lesotho Lowlands Bulk Water Supply (LLBWSS). Responsible for overall project management, including writing the inception and ESIA reports. Also responsible for managing all specialists and sub-contractors as well as overall financial management of the project.

Scoping and environmental impact assessment (EIA) for the Brixton reservoir and tower, South Africa, Gauteng, Johannesburg Water (JW), 02/2017 - 12/2018, Senior Environmental Consultant

Zutari was appointed to undertake an innovative, design-led thinking approach to the installation of a reservoir and tower in Brixton, Johannesburg. The project involves undertaking a scoping and environmental impact assessment (EIA) process, due to the preferred site's location on a ridge that was identified as highly sensitive by the Gauteng Department of Agriculture and Rural Development. The project also involved an extensive public consultation process. Responsible for overall project management of the environmental component, including writing the scoping and EIA reports, as well as compiling the environmental management programme.

Various overhead lines (OHL) for Mogalakwena Local Municipality, South Africa, Limpopo, Mogalakwena Local Municipality, 05/2015 - 06/2018, Geographic Information Systems (GIS) Support Expert

Zutari was appointed for the detailed design and construction supervision of 11 kV and 33 kV overhead lines in the Mogalakwena municipal area due to difficulty accessing the existing lines for maintenance. Sensitive features in terms of the Limpopo conservation plan were identified on both the proposed alternative route and the existing route. Responsible for geographic information systems (GIS) support to the project team.

Design concept for South Dunes Beach, South Africa, KwaZulu-Natal, Transnet National Ports Agency (TNPA), 08/2017 - 06/2018, Project Manager/Senior Environmental Consultant

Zutari has been appointed for the provision of the design concept for South Dunes Beach at the Port of Richards Bay. Responsible for overall project management, coordination of specialist inputs and environmental inputs.

Botswana-South Africa (BOSA) Transmission Interconnector Project, South Africa and Botswana, Southern African Power Pool (SAPP), 04/2016 - 04/2018, Environmental Consultant

The Botswana-South Africa (BOSA) Transmission Interconnector Project entails the construction of approximately 560 km of 400 kV transmission line between Botswana and South Africa to alleviate congestion on the Matimba-

Phokoje-Insukamini line, increase the power transfers within the Southern African Power Pool (SAPP) network, increase stability in the power pool and improve system control, adequacy and reliability. Zutari was appointed to provide transaction advisory services, including a scoping study and a feasibility study up to the project implementation phase, which included procurement of an engineering, procurement and construction (EPC) firm and project financial close. Zutari's services focussed on the collection of data and information, techno-economic and financial analysis, market review and analysis, evaluation of analytical results, advice on institutional and legal framework, reporting and liaising with client and sponsor management committees. Responsible for providing environmental support to project team.

Rooiwal photovoltaic (PV) facility, South Africa, Gauteng, New GX Metsena Joint Venture, 02/2017 - 02/2018, Project Manager/Environmental Consultant/Geographic Information Systems (GIS) Expert

Zutari undertook a basic assessment process and the design of a 20 MW solar park in Tshwane. While conducting the basic assessment, the need for specialist investigations were discovered and hence a heritage impact assessment and ecological and wetland assessment were also included. Responsible for overall project management, review of reports and geographic information systems (GIS).

Section 24G environmental application for Nkomazi Game Reserve, South Africa, Mpumalanga, Nkomazi Game Reserve, 08/2016 - 12/2017, Geographic Information Systems (GIS) Support Expert

Zutari was appointed to assist the client in processing a Section 24G application for the construction of a luxury lodge consisting of 12 tents near the Komati River as well as the establishment of a waterhole and an airstrip in the Nkomazi Game Reserve. The application considers the effects of the tents on the surrounding environment with the aim of determining issues, potential impacts and alternatives in terms of environmental impact. Responsible for providing geographic information systems (GIS) support to project team.

Merino photovoltaic (PV) power plant, South Africa, Free State, EAB-Astrum Energy (Pty) Ltd, 08/2011 - 11/2017, Project Manager/Geographic Information Systems (GIS) Support Expert

The project entailed the construction of a photovoltaic (PV) power plant that will produce approximately 6 MW of electricity. In total, roughly 27 000 PV modules will be utilised to produce the approximately 6 MW of energy fed into the existing 22 kV power lines at the Merino Hydro Power Plant. The Merino Hydro Power Plant, which is the only generator on the existing line, generates a maximum capacity of 3.45 MW of energy, leaving sufficient capacity for the PV power plant. Responsible for obtaining environmental authorisation (EA), overall project management and providing geographic information systems (GIS) mapping requirements.

Pre-feasibility study for the Mandela Gateway to Kruger, South Africa, Mpumalanga, Thebe Tourism Group, 09/2017 - 11/2017, Senior Environmental Consultant

The proposed Mandela Gateway to Kruger Project is located on the 1 400 ha Lisbon Estate, which is a keystone property that links Sabi Sand Game Reserve and the Kruger National Park into an ecological corridor of wildlife movement. Lisbon citrus farm, which was one of the first land claims post 1994, had fallen into disrepair and no source of income was generated. Zutari was appointed for the project management, architectural, quantity surveying (QS), engineering, environmentally sustainable design (ESD), environmental and town and traffic planning for the pre-feasibility study, which can be used by the client to stimulate investor interest. Responsible for environmental screening and reporting.

Design and construction supervision for the Mokolo Crocodile Water Augmentation Project (MCWAP), South Africa, Limpopo, Trans-Caledon Tunnel Authority (TCTA), 09/2009 - 08/2017, Geographic Information Systems (GIS) Support Expert

Extensive augmentation of water supply in the Lephalale region is required for the development of the Medupi Power Station and related coal mining and industrial activities. The infrastructure is being developed in two phases. Phase 1 comprises a 4.5 MW pump station and 43 km of up to 1.1 m diameter pipeline, delivering approximately 40 Mm^3/a at a rate of 1.6 m^3/s from the Mokolo Dam. This will be constructed parallel to and tying in with infrastructure supplying Grootegeluk Mine, Matimba and Medupi Power Stations and Lephalale Municipality. Phase 2 will comprise an abstraction weir in the Crocodile River, de-gritting channels with high and low lift pump stations, and a 160 km of pipeline with break pressure and balancing reservoirs. The abstraction weir has a capacity of 25.5 m^3/s, and the estimated pump capacities for the low lift and high lift pumps will be 3.6 MW and 15 MW, based on an initial demand of 5.4 m^3/s. The 160 km of pipeline consists of a 30 km rising main and a 120 km gravity main. Pipe diameters range from 1m to 2.3 m. The final configuration of Phase 2 is yet to be confirmed. Responsible for providing general geographic information systems (GIS) assistance to the project team and compiling maps specifically designed for the land acquisition process.

Transaction management services for the Mauritius Light Rapid Transit (MLRT) system, Mauritius, Aurecon Singapore, 10/2012 - 08/2017, Environmental Consultant

The Government of Mauritius is committed to build a light rapid transit (LRT) system serving the city areas between Port Louis and Curepipe in order to relieve the main road arteries and to review its existing bus network with the aim of achieving an efficient multi-modal public transport network. Zutari was appointed, as a partner to lead agency Singapore Cooperation Enterprise (SCE) and the Singapore Mass Transit Corporation (SMRT), to provide transaction management advisory services for the development of the Mauritius LRT system. This included

advisory services for transport and traffic planning, engineering and business case/financial planning. Responsible for environmental specialist coordination and liaison.

Olifants River Water Resources Development Project, Phase 2 (ORWRDP-2), South Africa, Limpopo, Trans-Caledon Tunnel Authority (TCTA), 09/2009 - 06/2017, Geographic Information Systems (GIS) Support Expert

The second phase of the Olifants River Water Resources Development Project (ORWRDP-2) is an extensive water resource development project to supply water for domestic and industrial (mining) use in Limpopo. The project was divided into two main schemes. The first scheme comprised a 70 km-long pumping main from the Flag Boshielo Dam to Mokopane, including three 6 MW pump stations en route. The second scheme consisted of the abstraction and distribution of water from the De Hoop Dam to various end points. Both schemes were monitored and controlled from a single remote control point with all elements linked via approximately 180 km of fibre optic cable. Zutari's scope included the tender design and documentation, detailed design, construction supervision, contract administration, preparation of an environmental management plan (EMP), environmental impact assessments (EIAs) and a water quality baseline study. Responsible for providing general geographic information systems (GIS) assistance to the project team and compiling maps specifically designed for the land acquisition process.

Viljoenskroon substation transmission basic assessment (BA), South Africa, Free State, Eskom Free State Operating Unit, 08/2015 - 06/2017, Project Manager/Environmental Consultant/Geographic Information Systems (GIS) Expert

Zutari was appointed to undertake a basic assessment (BA) and general authorisation for various small infrastructure improvements in the Viljoenskroon and Vierfontein areas. The improvements involved the construction of a new switching station, substations, distribution lines, and the decommissioning of distribution lines. Responsible for overall project management, public participation, review of reports and geographic information systems (GIS). Duties included the compilation of a basic assessment report (BAR) and environmental management programme (EMPr), addressing comments received from the public and landowners, requesting extension from competent authority, revision of specialist reports and commenting on authority and specialist interactions.

Construction of Siphofaneni Bridge - St Phillips Road: Phases I, II, and III, Swaziland, Delegation of the European Union to the Kingdom of Swaziland, 06/2009 - 12/2016, Geographic Information Systems (GIS) Support Expert

Zutari was appointed for the preliminary and detailed design, tender documentation and environmental impact assessment (EIA) for the construction of the Siphofaneni Bridge - St Phillips Road: Phases I, II, and III. The project entailed the construction of a new 300 m two lane bridge over the Usutu River, a 1 km link from the MR8 on the MR14 up to existing junction to St Phillips Road, a 23 km link from the MR14 junction to St Phillips Road as well as a 7.7 km link from St. Phillips Road to the MR8 over the Usutu River. These links were upgraded from the existing gravel roads to an appropriate standard that provides all weather access to the existing and new cane growers. This upgrading also provides improved access for the administrative centre at St. Phillips. Responsible for geographic information systems (GIS) assistance to the project team.

Exxaro Grootegeluk roads building feasibility study, South Africa, Limpopo, Exxaro Coal, 04/2014 - 12/2016, Geographic Information Systems (GIS) Support Expert

Exxaro Grootegeluk Mine, in collaboration with the Lephalale Municipality and Eskom, agreed to upgrade three district roads that traverse the various communities of Lephalale and to provide for the development of various long-term economic and employment opportunities. The identified roads for the upgrade included provincial roads D3102 and D3114. Zutari undertook feasibility study to investigate the implementation of labour intensive construction (LIC) methods during the upgrading as well as the implementation of entrepreneurial and local economic development initiatives. Responsible for geographic information systems (GIS) support to the social project team for the Exxaro Grootegeluk Mine roads upgrade feasibility study and social baseline assessment.

Basic assessment report (BAR) for the Ga-Rankuwa Cemetery, South Africa, Gauteng, City of Tshwane Metropolitan Municipality (CTMM), 01/2015 - 12/2016, Project Manager/Environmental Practitioner/Geographic Information Systems (GIS) Expert

Zutari was appointed to conduct the environmental basic assessment process for the proposed expansion of the existing Ga-Rankuwa cemetery as it had reached full capacity. Responsible for overall project management, public participation, compilation of reports and geographic information systems (GIS).

Environmental authorisation (EA) for Khanyisa Power Station, South Africa, Mpumalanga, ACWA Power Africa Holdings, 01/2015 - 12/2016, Geographic Information System (GIS) Support Expert

The project involved applying for the amendment of the environmental authorisation (EA) for the proposed Khanyisa Power Station and the amendment of authorisations for associated infrastructure, including a water supply pipeline, substation and transmission line. Zutari commissioned specialist studies, including air quality, stormwater, waste, noise and traffic, to address the potential environmental and social impacts of the project; compiled an amendment report summarising the change in these impacts; undertook the public participation/stakeholder engagement process and applied for the amendment of the water use licence application (WULA). Further applications included a scoping and environmental impact assessment (EIA) process for

repositioning the substation and 400 kV transmission line and a basic assessment for repositioning a water supply pipeline. Responsible for geographic information systems (GIS) support to the project team.

Waste management licence applications for Rooiberg landfill, South Africa, Limpopo, Department of Environmental Affairs (DEA), 01/2014 - 12/2016, Geographic Information Systems (GIS) Support Expert

The Department of Environmental Affairs (DEA) undertook a study, commissioned in 2007, which identified unlicensed municipal waste disposal facilities in South Africa. From the 581 sites that were identified, 341 were disposal facilities that needed to be licensed. Zutari was appointed to conduct and manage the waste management licence applications on behalf of all affected municipalities. The scope involved solid waste management, transfer of skills to officials, legal compliance, environmental impact assessment (EIA) and environmental management. Responsible for geographic information systems (GIS) support to the project team.

Technical feasibility study for the Botterkloof and Merino II Hydro Power Plants, South Africa, Free State, NuPlanet (Pty) Ltd, 01/2007 - 08/2016, Environmental Practitioner/Geographic Information Systems (GIS) Support

NuPlanet appointed Zutari to undertake a technical feasibility study, preliminary geotechnical investigations and the preliminary design of hydropower stations near Bethlehem. These power stations would use the increased flow from the Lesotho Highlands Water Project (LHWP) and would be cascading schemes. Two of the power stations generate in the order of 4.2 MW each, whilst a third station generates 3.1 MW. All three stations are typical run-of-river installations with proposed 8 m-high diversion weirs, headrace canals and penstocks. Zutari also received a separate appointment to undertake the environmental studies required for the development of all three schemes and the provision of the necessary support to the client for the statutory water use licence applications (WULAs). Responsible for obtaining environmental authorisation (EA) and providing geographic information systems (GIS) support.

Hatherley Cemetery expansion basic assessment, South Africa, Gauteng, City of Tshwane Metropolitan Municipality (CTMM), 01/2015 - 07/2016, Project Manager/Environmental Practitioner/Geographic Information System (GIS) Expert

Zutari was appointed to conduct the environmental basic assessment process for the proposed expansion of the existing Hatherley cemetery in Mamelodi as it had reached full capacity. Responsible for overall project management, public participation, compilation of reports and geographic information systems (GIS).

Basic assessment report (BAR) for the Mabopane Cemetery expansion, South Africa, Gauteng, City of Tshwane Metropolitan Municipality (CTMM), 01/2015 - 06/2016, Project Manager/Environmental Practitioner/Geographic Information Systems (GIS) Expert

Zutari was appointed to conduct the environmental basic assessment process for the proposed expansion of the existing Mabopane cemetery as it had reached full capacity. Responsible for overall project management, public participation compilation of reports and geographic information systems (GIS).

Klipplaats 400 kV line deviation, South Africa, Mpumalanga, Glencore Xstrata Coal South Africa (Glencore South Africa (Pty) Ltd, 05/2014 - 05/2016, Geographic Information Systems (GIS) Support Expert/Report Reviewer

The project involved environmental studies, water use licence application (WULA) and preliminary design for the Klipplaats 400 kV line deviation at the Tweefontein Coal Mine. Responsible for geographic information systems (GIS) support to the project team as well as document review.

Extension of the Sunderland Ridge wastewater treatment works (WWTW), South Africa, Gauteng, City of Tshwane Metropolitan Municipality (CTMM), 01/2007 - 03/2016, Environmental Control Officer (ECO)

Zutari was appointed to provide the engineering services for the extension of the Sunderland Ridge wastewater treatment works (WWTW) to 95 Ml/d. The purpose of the project was to provide a feasibility study for the 30 Ml/d extension; licence applications; environmental impact assessments (EIAs) and the relevant authorisations for the 30 Ml/d extension and process design of the extension. Responsible for all environmental site inspections, the compilation of inspection and process reports, attending the monitoring and liaison committee's (MLC's) meetings and assisting with the compilation of an operational environmental management plan (EMP).

Landau dragline relocation concept study, South Africa, Mpumalanga, Anglo American Coal South Africa, 03/2015 - 03/2016, Geographic Information Systems (GIS) Support Expert

Zutari's environmental team conducted a desktop screening level assessment for the various route alignments against existing geographic information systems (GIS) databases/policies from relevant departments. Responsible for GIS support to the project team.

Boston and Ouhout environmental impact assessment (EIA), South Africa, Free State, NuPlanet (Pty) Ltd, 04/2010 - 12/2015, Project Manager

The project entailed an environmental impact assessment (EIA) class application for environmental authorisation (EA) for the construction of two hydropower schemes. Responsible for obtaining EA and providing geographic information systems (GIS) mapping requirements.

Shisha River bridge basic assessment (BA), South Africa, Limpopo, Gibb Engineering and Science/South African National Parks (SANParks), 03/2014 - 12/2015, Project Manager/Geographic Information Systems (GIS) Expert

Zutari was appointed to provide environmental services for the basic assessment (BA) of the proposed repair and upgrading of the Shisha River low level bridge located on the S57 near Sirheni Bushveld Camp in the northern section of the Kruger National Park.

Environmental impact assessment (EIA) at the Komati Mill, South Africa, Mpumalanga, TSB Sugar, 06/2014 - 12/2015, Geographic Information Systems (GIS) Support Expert

Zutari was appointed to conduct a basic environmental assessment of an agricultural area for the proposed establishment of sugar cane fields at TSB Sugar's Komati Mill. Responsible for geographic information systems (GIS) support to the project team.

Eskom Vaaldam basic assessment report (BAR), South Africa, Free State, Eskom, 04/2014 - 10/2015, Project Manager/Geographic Information Systems (GIS) Support Expert

Zutari was appointed to conduct the basic assessment (BA) for the proposed Vaaldam 88 kV power line near Deneysville to the T-off near Clydesdale.

Environmental impact assessment (EIA) for Esiama gas-fired generation plant, Ghana, Western and Ashanti Region, Aggreko, 04/2015 - 07/2015, Environmental Practitioner

Zutari was appointed for the updating and completion of the environmental impact assessment (EIA) process for the 140 MW gas-fired generation plant in Esiama, including specialist studies for air quality, noise, ecology and waste. An environmental permit was granted by the Ghana Environmental Protection Agency (EPA).

Environmental impact assessment (EIA) for the Swaziland Rail Link Project, South Africa and Swaziland, Transnet Capital Project (TCP), 02/2013 - 06/2015, Geographic Information Systems (GIS) Support Expert

Zutari was appointed to provide environmental services for the required environmental impact assessment (EIA) of the proposed Swaziland Rail Link, which runs from Davel to Nerston in Mpumalanga, through Swaziland, to Nsezi in Richards Bay, KwaZulu-Natal. The aim of the project is to unlock the potential of a multinational strategic rail corridor and divert general freight traffic off the dedicated heavy haul Richards Bay coal line. The project activities included the upgrading of existing railway sections, the construction of a new rail link from Lothair to Sidvokodvo in Swaziland and the construction of new rail yards. Responsible for all geographic information systems (GIS) functionalities on the project.

Basic assessment (BA) for conference facilities and guest accommodation in Irene, South Africa, Gauteng, University of South Africa (UNISA), 02/2010 - 09/2014, Project Coordinator

The project entailed engineering services for the basic environmental assessment of the construction of conference facilities and guest accommodation, including paved parking, at the UNISA Park in Irene. Responsible for geographic information systems (GIS) mapping requirements and project coordination.

Environmental impact assessment (EIA) for the Sigma-Theta power line, South Africa, KwaZulu-Natal, Eskom, 10/2010 - 08/2014, Geographic Information Systems (GIS) Support Expert

The increased demand in load centres in KwaZulu-Natal necessitated the strengthening of the transmission network. Zutari was appointed as the independent environmental practitioner to undertake the environmental impact assessment (EIA) for the construction of the 400 kV line between the proposed Isundu substation near Pietermaritzburg to the proposed Mbewa substation near Epangeni. The project provided for the strengthening of the network and, in particular, to provide for the demand increase at load centres in Pietermaritzburg and Empangeni.

Nkomazi environmental management framework (EMF), South Africa, Mpumalanga, Nkomazi Local Municipality, 01/2014 - 07/2014, Geographic Information Systems (GIS) Support Expert

The project entailed compiling an environmental management framework (EMF) for the Nkomazi Local Municipality, located south of the Kruger National Park. The environmental status quo, strengths, weaknesses, opportunities and threats (SWOT) analysis and EMF phases were done, delivering environmental management zones, each with a set of management guidelines.

Basic assessment (BA) for the 88 kV Pangaea/Kanga power lines, South Africa, Mpumalanga, Eskom, 05/2013 - 06/2014, Project Manager/Geographic Information Systems (GIS) Support Expert

Eskom proposed the establishment of two 88 kV substations, Pangaea and Kanga, in conjunction with two 88 kV loop-in-loop-out lines from the existing 88 kV Erasmus-Arbor line in order to ensure electric supply for the upcoming Kusile Railway Line. The railway line will be constructed as a private siding, which is needed to transport limestone to the Kusile Power Station. Zutari was appointed to conduct a basic assessment (BA) as well as a Level 1 wetland assessment to determine the extent of wetland or wet areas that are related to the proposed routes chosen for the construction of the Pangaea and Kanga 88 kV power lines. Responsible for overall project management and geographic information systems (GIS) functionalities on the project.

Upgrading and replacement of a bulk water pipeline along Simon Vermooten Road, South Africa, Gauteng, City of Tshwane Metropolitan Municipality (CTMM), 06/2006 - 02/2014, Geographic Information Systems (GIS) Support

The project involved the upgrading of the Simon Vermooten Road to a two carriageway road in both directions, which required the relocation of the existing 625 mm nominal diameter steel pipeline. The scope of work involved the supply, delivery and installation of a new 700 mm nominal diameter steel pipeline between Lynnwood and Waltloo Roads as well as the supply, delivery and installation of a 400 mm nominal diameter steel pipeline Waltloo and Stormvoël Road. Zutari carried out the preliminary and detailed design, including a site survey, geotechnical investigations, tender documentation and adjudication, construction supervision and project management, contract administration and record drawings and environmental services. Responsible for all geographic information systems (GIS) support.

Monograph study for the Limpopo River Basin, South Africa, Mozambique, Botswana and Zimbabwe, Limpopo Water Course Commission (LIMCOM)/Deutsche Gesellschaft für Internationale Zusammenarbeit, 02/2012 - 02/2014, Geographic Information Systems (GIS) Support to Social Team

The project comprised the compilation of essential information regarding water resources, land use, environmental and water quality, infrastructural and climate change, on the Limpopo River Basin. The information is required for the development of Limpopo River Basin Integrated Water Resources Management (IWRM) strategy for the sustainable management of the basin. The study collects, collates and compiles key information that is necessary for scenario development and ultimately an IWRM plan. The data feeds to the Limpopo River Basin Management Information System (LIMIS) that is used for the long-term monitoring of the impacts of economic and social development of the water resources of the basin.

Engineering services for a new Sasko bakery in Woodmead, South Africa, KwaZulu-Natal, Pioneer Food Group, 04/2007 - 02/2014, Geographic Information Systems (GIS) Expert/Environmental Practitioner

The project entailed the provision of full planning and engineering services for the development of Sasko's new bakery in Woodmead. Zutari provided architectural, project management, civil, structural, electrical, mechanical, fire and wet services engineering for the new bakery complex, including an ancillary administration block, a washbay and a workshop.

Vaal River Eastern Subsystem Augmentation Project (VRESAP), South Africa, Gauteng, Trans-Caledon Tunnel Authority (TCTA), 12/2004 - 12/2013, Environmental Practitioner/Geographic Information Systems (GIS) Support

Zutari was appointed for the design and construction supervision of the Vaal River Eastern Sub-system Augmentation Project (VRESAP), an emergency water transfer scheme that abstracts water from the Vaal Dam and pumps it to the Knoppiesfontein division structure over a distance of 115 km. From the division structure the water is gravitated to the Bosjesspruit and Trichardtsfontein Dams. The project, with a design capacity of 5.4 m^3/s, comprised abstraction works in the Vaal Dam, a low-lift pump station and a high-lift pump station as well as a rising main. It also included a 10 Ml surge tank to control dynamic transients, a concrete division structure at Knoppiesfontein, a number of road and rail crossings and various pipeline appurtenances such as in-line isolation valves and air valve and scour installations. Cathodic protection of the pipeline and a sophisticated control and instrumentation (C&I) system were also provided. Responsible for geographic information systems (GIS) support, overseeing all environmental aspects of the project, and the compilation and submission of 28 borrow pit closure plans to the Department of Minerals and Energy (DME).

Closure of a sludge dam and overflow facility for Rand Water, South Africa, Gauteng, Rand Water, 07/2007 - 07/2013, Environmental Practitioner/Geographic Information Systems (GIS) Support

The embankment of the old sludge dam adjacent to the Zuikerbosch pumping station failed a couple of years ago and sludge was discharged into the Vaal River. Zutari was appointed to inspect and register the dam as a “dam with a safety risk” in the Category II as well as for the design of the closure and decommissioning of the sludge dam and overflow facility. The scope of works included surveying, geotechnical investigation, environmental impact assessment (EIA), design, reporting and supervision. Responsible for public participation, obtaining environmental authorisation (EA) for exemption application and providing general geographic information systems (GIS) support to the project team.

Mokolo Crocodile (West) Water Augmentation Study, South Africa, Limpopo, Department of Water and Sanitation (DWS), 03/2007 - 07/2013, Geographic Information Systems (GIS) Support

This Mokolo Crocodile River (West) Water Augmentation Scheme will provide water to strategic users in the Lephalale area, such as Sasol, Eskom and various coal mines. The client had a need to conduct a feasibility study to determine the best option for supplying the area with water. It included supply from Mokolo Dam and transferring water from the Crocodile River to the growth hot spots around Lephalale, 130 km to the north. The project also entailed a single 1.9 m diameter rising main covering a distance of 115 km. Responsible for providing general geographic information systems (GIS) assistance to the project team.

Raising of North Boundary Dam, Carletonville, South Africa, Gauteng, AngloGold Ashanti, 02/2009 - 04/2013, Environmental Practitioner/Geographic Information Systems (GIS) Support

The project entailed providing assistance to the client with the re-evaluation of the North Boundary Dam's capacity and making recommendations to reduce overflow, especially during rainy seasons to avoid polluting the downstream river system. Following the feasibility studies in 2008, Zutari was appointed to undertake the detailed design, tender process and construction supervision for the raising of the dam in Carletonville. Zutari also carried out the environmental impact assessment (EIA) for the raising of the dam in an advisory capacity. Responsible for obtaining environmental authorisation (EA) and providing general geographic information systems (GIS) support throughout the project team.

Basic assessment (BA) for the duplication of the Vlakfontein-Mamelodi water supply pipeline, Phase 2, South Africa, Gauteng, Rand Water, 07/2007 - 04/2013, Geographic Information Systems (GIS) Support

The project entailed conducting a basic assessment (BA) and compiling an environmental management plan (EMP) to obtain the necessary environmental authorisation (EA) for the construction of a water supply pipeline for Phase 2 from Vlakfontein in Benoni to the southern boundary of the Rietvlei Nature Reserve.

De Hoop Dam borrow pit closure, South Africa, Limpopo, Vela VKE/Department of Water and Sanitation (DWS), 01/2011 - 01/2013, Project Manager/Environmental Practitioner

Zutari was appointed to conduct the closure of the De Hoop Dam borrow pit by means of formally requesting the Department of Mineral Resources (DMR) to authorise the closure of the subject borrow pit. Material for road construction was sourced from this borrow pit using an open cast method.

Expansion of the iron ore line from Sishen to the Port of Saldanha, South Africa, Western Cape, Transnet Capital Projects, 09/2009 - 12/2012, Geographic Information Systems (GIS) Support Expert

The Sishen-Saldanha ore line is an 861 km-long, single, heavy-haul railway line used for exporting iron ore from the mines in the Sishen area to the Port of Saldanha. The project involved the upgrading of the iron ore line from 38 Mtpa to 47 Mtpa (Phases 1A and 1B), and a further expansion from 47 Mtpa to 60 Mtpa by 2012 (Phase 1C). The rail upgrade plans included an increase in rolling stock (wagons and locomotives), the upgrading of electricity infrastructure, the construction of additional train passing loops and a 32 km rail link to service the new Sishen South mine. Infrastructure at the bulk terminal at the Port of Saldanha comprises two rotary tipplers, four stacker-reclaimers, two shiploaders and 25 conveying systems, providing the terminal with a capacity to offload 10 000 t/h onto a ship. The infrastructure is expected to be expanded to accommodate the expansion to 83 Mtpa. Environmental impact studies (EISs) were also needed for the establishment of new infrastructure. The plan was to reclaim an additional 50 ha within Saldanha Bay. The shipping channel would be deepened and the material recovered would be used for the construction of new shipping berths. Responsible for geographic information system (GIS) support to the project team.

Laudium-Iliso pipeline environmental support, South Africa, Gauteng, Iliso Consulting, 05/2008 - 06/2011, Environmental Practitioner/Geographic Information Systems (GIS) Support

The project entailed a basic assessment (BA) in terms of the National Environmental Management Act's (NEMA's) environmental impact assessment (EIA) regulations for the installation of a 700 mm internal diameter potable water pipeline over a distance of 600 m. Responsible for public participation, obtaining environmental authorisation (EA), fulfilling the environmental control officer (ECO) function and providing general geographic information system (GIS) support to the project team.

Environmental management system (EMS) for Automotive Supplier Park (ASP) in Rosslyn, South Africa, Gauteng, Supplier Park Development Company (SPDC), 02/2007 - 06/2011, Environmental Practitioner/Geographic Information Systems (GIS) Support

This project entailed the implementation of an environmental management system (EMS) at the Automotive Supplier Park (ASP) in Rosslyn, Pretoria. The project was one of the Gauteng Provincial Government's Blue IQ initiatives aimed at delivering strategic infrastructure in the South African automotive industry to stimulate sustainable economic growth and job creation in the province. Responsible for all geographic information systems (GIS) support.

Basic assessment (BA) for the upgrading of the Valhalla reservoir, South Africa, Gauteng, City of Tshwane Metropolitan Municipality (CTMM), 10/2006 - 11/2010, Environmental Practitioner

The project entailed a basic environmental assessment for the authorisation of the construction of a new reservoir adjacent to an existing reservoir in Valhalla, Pretoria. Responsible for obtaining environmental authorisation (EA) and providing geographic information systems (GIS) support.

Laudium and Waterkloof pipelines, South Africa, Gauteng, City of Tshwane Metropolitan Municipality (CTMM), 10/2006 - 07/2010, Environmental Practitioner

The project consisted of a basic assessment (BA) in terms of the National Environmental Management Act's (NEMA's) environmental impact assessment (EIA) regulations for the removal of the existing 700 mm diameter pipeline and the replacement thereof with a new pipeline, over a distance of 1.5 km. Responsible for all the environmental control officer (ECO) duties during construction.

Basic assessment (BA) for the Rand Water R5 pipeline between Rietvlei Dam and Mamelodi, Phase 2, South

Africa, Gauteng, Rand Water, 01/2009 - 01/2010, Geographic Information Systems (GIS) Support Expert

The project entailed conducting a basic assessment (BA) and compiling an environmental management plan (EMP) to obtain the necessary environmental authorisation (EA) for the construction of a water supply pipeline for Phase 2 from the Rietvlei Nature Reserve to Mamelodi.

Upgrading of Riverview wastewater treatment works (WWTW), South Africa, Mpumalanga, Emalahleni Local Municipality, 10/2008 - 10/2009, Environmental Practitioner/Geographic Information Systems (GIS) Support

The effluent from the Riverview wastewater treatment works (WWTW) has to comply with the special limit discharge standards applicable to the upper Olifants River. It was recommended that the existing WWTW be retrofitted and the reliable treatment capacity of the facility be improved to increase the present design capacity of 11 Ml/d to 14 Ml/d to make provision for the higher organic loading received and the expected increase in flow due to future growth. The project scope included work on the inlet screen, primary settling tanks (PSTs), sludge pump station, aerators, bio-filters, final clarifiers, return pump station and humus pump station. Responsible for public participation, obtaining environmental authorisation (EA) for exemption application and providing general geographic information systems (GIS) support to the project team.

Overhead power line from Ha Lejone to Liqhobong Mine, Lesotho, Liqhobong Mining Development Company (LMDC), 09/2006 - 08/2008, Environmental Practitioner

The project entailed the environmental impact assessment (EIA) for a 40 km 132 kV overhead power line from the Ha Lejone substation to the Liqhobong Diamond Mine to supply electricity to the mine. The mine operated on power supplied from generators, which was costly since it is dependent on the fuel price. The preferred alternative was the design and construction of an overhead supply, seen against the projections on extension of the life of the mine. Responsible for providing geographic information systems (GIS) support for the EIA process, report compilation and submission for final authorisation.

Basic assessment (BA) for the upgrading of the Jericho Bridge 4062, South Africa, Mpumalanga, Department of Water and Sanitation (DWS), 01/2007 - 01/2008, Environmental Practitioner/Geographic Information Systems (GIS) Support

The project entailed a basic environmental assessment and report compilation for authorisation of the construction for the Jericho Bridge in Ermelo, which was to accommodate a 1:50 year flood. Responsible for obtaining environmental authorisation (EA) and the compilation of reports.

Rietfontein weir environmental management plan (EMP), South Africa, Mpumalanga, Department of Water and Sanitation (DWS), 04/2006 - 12/2007, Environmental Practitioner

The project consisted of the re-instatement of storage capacity by means of dredging and landfilling 25 000 m² of silt to provide an approach canal at the outlet pipes. The scope entailed a plan of study for scoping, the compilation of the scoping reports and an environmental management plan (EMP). Responsible for obtaining environmental authorisation (EA) and providing geographic information systems (GIS) support.

Upgrading of Rietfontein Nature Reserve, South Africa, Gauteng, Johannesburg City Parks (JCP), 06/2007 - 09/2007, Environmental Control Officer (ECO)

The Rietfontein Nature Reserve in Paulshof is recognised as a developed park in northern Johannesburg and is known for its indigenous green space. The existing infrastructure on site is largely used as an educational centre to teach school children about the conservation of ecosystems. With the focus on conservation and outdoor recreation, eco-tourism opportunities do exist to generate income from the facilities and activities offered at the Rietfontein Nature Reserve. The proposed developments are seen to further draw on such opportunities for both Johannesburg City Parks (JCP) and the community it serves. Responsible for the communication of environmental management plan (EMP) components and requirements to the contractors and sub-contractor as well as EMP planning, implementation and inspection during the construction phase.

Basic assessment (BA) for the McHardy stream diversion, South Africa, Gauteng, De Beers Group, Cullinan Diamond Mine, 07/2006 - 09/2007, Environmental Practitioner

The project consisted of a basic assessment (BA) in terms of the National Environmental Management Act's (NEMA's) environmental impact assessment (EIA) regulations for the diversion of the McHardy stream through the Cullinan Diamond Mine grounds to establish separation of polluted runoff from mining activities and unpolluted natural stormwater flow. Responsible for obtaining environmental authorisation (EA) and geographic information systems (GIS) support.

Proposed new coal-fired power station in the northern Free State, South Africa, Free State, Eskom Generation, 03/2006 - 09/2007, Environmental Practitioner

The project comprised the construction of a 4 200 MW greenfield, which was previously undeveloped, and a coal-fired power station as well as the construction and operation of associated infrastructure, including a high-voltage (HV) yard, water treatment and supply facilities, an ash management system, coal transportation, storage and handling facilities and service roads. Responsible for providing assistance with the public participation process (PPP).

Basic assessment (BA) for the upgrading of the Khutala pump station, South Africa, Mpumalanga, Department of Water and Sanitation (DWS), 03/2007 - 08/2007, Geographic Information Systems (GIS) Support

The project entailed a basic environmental assessment for the authorisation of the upgrading and replacement of water mains at the Khutala pump station in Kriel to ensure increased capacity and reduced operating costs of the facility. Responsible for providing geographic information systems (GIS) support to the project team.

Proposed new coal-fired power station in the Witbank area, South Africa, Mpumalanga, Eskom Generation, 01/2005 - 01/2006, Environmental Practitioner

Zutari was appointed as lead consultants for a comprehensive environmental impact assessment (EIA) for the construction and operation of a coal-fired power station and its associated infrastructure in Witbank. The power station would comprise six generating units fuelled by coal, with a total nominal electricity generation capacity of approximately 5 400 MW. Various ancillary infrastructure was also present, including a high-voltage (HV) yard within the power station precinct; water supply pipelines; water and wastewater treatment facilities; temporary electricity supply during construction; ash disposal systems; coal stockyard and handling facilities; storage and handling facilities; conveying systems for ash and coal; rail and/or road transport of sorbent; access roads and storage dams. Responsible for providing assistance with the public participation process (PPP).

Upgrading of the Muela Hydropower Station, Lesotho, Lesotho Highlands Water Commission (LHWC), 01/2009 - Click or tap to enter a date.**, Environmental Practitioner/Geographic Information Systems (GIS) Support**

The project consisted of a social and resettlement study focussing particularly on the social impacts of the anticipated construction and related resettlement, including the compilation of an HIV/Aids management programme that could be implemented during the project implementation phase. Responsible for assistance in terms of the environmental impact assessment (EIA) and general geographic information systems (GIS) support.

Thune Dam examination for the possible construction of dams, Botswana, South-East District, Government of Botswana, 01/2009 - Click or tap to enter a date.**, Geographic Information Systems (GIS) Support**

Many towns, villages and settlements throughout Botswana were experiencing water shortage problems as the growing demand placed an increasing burden on groundwater resources, which are of limited extent, with recharge that cannot keep up with abstraction. The Government of Botswana responded to this by examining the possibility of constructing dams for conjunctive use by means of groundwater resources. Responsible for providing geographic information systems (GIS) support.

Due diligence assessment for the development of Bishop's Glen into a residential golf estate, South Africa, Free State, Golf Data, 01/2008 - Click or tap to enter a date.**, Geographic Information Systems (GIS) Support**

The project entailed a due diligence assessment for Golf Data (a leading South African company in the field of golf course design) to obtain part of the Bishops Glen RE/273 property near Bloemfontein to develop a residential golf estate of approximately 600 units. Responsible for environmental sensitivity mapping.

Relocation and protection of Petronet utility, South Africa, Gauteng, Transnet, 01/2007 - Click or tap to enter a date.**, Environmental Practitioner**

The project consisted of an environmental impact assessment (EIA) for the relocation and protection of an existing Petronet utility, which would be affected by the Gautrain Rapid Rail Link (GRRL). Responsible for liaising with the Department of Agriculture and Environmental Affairs (DAEA), bio-physical and socio-economic data gathering, public participation process (PPP), the compilation of an environmental impact report (EIR) and the environmental management plan (EMP) and site inspections.

Basic assessment (BA) of dams in Benoni, South Africa, Gauteng, Ekurhuleni Metropolitan Municipality (EMM), 01/2009 - Click or tap to enter a date.**, Project Manager**

The project involved a basic assessment (BA) for the widening of the Kleinfontein Dam spillway in Benoni. Responsible for geographic information systems (GIS) mapping requirements and project management.

Anheuser-Busch InBev (AB InBev) greenfields brewery, Ghana, Accra, Anheuser-Busch InBev (AB InBev), 01/2018 - Click or tap to enter a date.**, Senior Environmental Consultant**

Zutari has been appointed to conduct a geotechnical investigation and fatal flaw analysis to inform the decision of purchasing a greenfields site in Ghana for the new Accra brewery. Responsible for environmental inputs and review of the fatal flaw analysis.

Preston Padayachee

Civil Engineer

Qualifications
Bachelor of Science in Engineering

Professional registrations
Candidate Engineer, Engineering Council of South Africa (ECSA)
Associate Member, South African Institution of Civil Engineering (SAICE)
Member, Golden Key International Honour Society (GKIHS)

Specialisation
Civil engineering

Years in industry
3

Summary

Preston is a civil engineer at Zutari and has gained experience in airport master planning and design in South Africa, Nigeria and Rwanda. This includes geometric design of roads for windfarms and airport infrastructure according to the relevant standards. In addition, analysing the Obstacle Limitation Surfaces of airports according to the International Civil Aviation Organisation (ICAO) Annex 14.

Master planning at airports across South Africa has allowed him to contribute to the visual representation of the airside infrastructure being cognizant of the spatial requirements of the airport whilst still taking into consideration the existing infrastructure and its impact.

His previous experience during his career includes design of a combo court, creating bill of quantities and producing tender documentation for building rehabilitation of a crematorium. Furthermore, his experience covers desktop studies and site visits to locate, prospect and secure hard rock material for future SANRAL contracts in KwaZulu-Natal, South Africa.

He is efficient in applying design software packages from MicroStation and AutoCAD to generate designs, this includes the use of Civil 3D, OpenRoads and AviPLAN as geometric and simulation tools for design. His programming skills include VBA Programming in Excel, Python and Generative Components in MicroStation.

Relevant experience

Apron repair: Toivo Ya Toivo Airport, Namibia, Namibia Airports Company (NAC), 01/2020 - 12/2022, Civil Engineer

The project entails maintenance work on taxiway and apron of the airport. Responsible for the simulation of the design aircraft tracking along the upgraded taxiways using AviPLAN.

Etihad Rail Civil 3D, South Africa, WSP Group Africa (Pty) Ltd, 02/2021 - 05/2022, Civil Engineer

Zutari provided Civil 3D support services for Etihad Rail. Responsible for 3D modelling and clash detection of various utilities along railway corridor.

Preliminary engineering designs for RD5 wind farms, South Africa, EDF Renewables (Pty) Ltd, 04/2021 - 05/2022, Civil Engineer

Zutari provided preliminary engineering design for four proposed wind energy facilities (WEF). Responsible for geometric designs of access roads to transport wind turbines to various sites. Including corridor modelling and extraction of quantities.

OR Tambo International Airport pavement rehabilitation, South Africa, Gauteng, Airports Company South Africa (ACSA), 06/2012 - 09/2021, Civil Engineer

Airports Company South Africa (ACSA) required professional engineering services for the rehabilitation of airside pavement infrastructure at airports nationwide. Zutari was appointed to provide professional civil engineering services for the rehabilitation work for a 5-year period at OR Tambo International Airport. Responsible for proposing a new alignment for electrical services to ensure that potential clashes are avoided. Also responsible for providing setting out details for the new alignments.

Jalingo Airport runway rehabilitation and upgrades, Nigeria, Taraba, Nigeria Taraba State: Ministry of Transport, 03/2020 - 04/2021, Civil Engineer

Zutari was appointed for the upgrade and rehabilitation of the Jalingo Airport Runway and design of a new parallel runway and related taxiways in Taraba State, Nigeria. The appointment includes airside infrastructure, drainage,

paint markings and aeronautical ground lighting (AGL). The project will still enable Code E aircraft operations and considers the phasing of construction, as the airport must remain operational during the construction activities. Responsible for high-level geometric designs for various runway alternatives, this included evaluation of the Obstacle Limitation Surface and consideration of resultant earthworks quantities. Also responsible for preparation of documentation for client submissions and presentations.

ACSA master plans, South Africa, Airports Company South Africa (ACSA), 02/2019 - 03/2021, Civil Engineer

Zutari was appointed to develop fully fledged airport master plans and development plans for Bram Fischer, George, Kimberley and Upington airports in order to address 21st century aviation trends such as commercialisation, globalisation and technological advances. Responsible for assisting the Project Director in developing various macro options for the airside development at the various airports incorporating standards stipulated by the International Civil Aviation Organization (ICAO). In addition, responsible for preparing relevant drawings to the Macro Options.

New Bugesera International Airport (NBIA), Rwanda, Bugesera District, Bugesera Airport Company Limited (BAC), 08/2017 - 12/2020, Civil Engineer

Zutari is providing design review and construction supervision services on the greenfield New Bugesera International Airport (NBIA) project, with capacity for 1.44 million passengers per year utilising a terminal building of approximately 30 000 m². The shape of the roof of the new terminal building represents Rwanda - land of a thousand hills and a million smiles and has an undulated form. The runway and parallel taxiway length will be 3.8 km, with the Airbus A330 as design aircraft. Responsible for reviewing and proposing a new road alignment for various sections of the airside perimeter road and landside access roads. Other duties included creating sketches on the spatial requirements and locality for various buildings; tracking the ARFF vehicle along the service roads using AviPLAN; preparing various sketches indicating services and utilities for review, and producing suggested changes/alternatives. Also responsible for carrying out checks and preparing relevant sketches on the impact of drainage structures on the airside utilities at intersections. Additionally, responsible for checking earthworks quantities.

Zinzi Portia Xakayi

Environmental Consultant

Summary

Zinzi is an environmental consultant at Zutari. She has experience in the compilation of environmental management programmes (EMPrs), basic assessment reports (BARs), and environmental screening reports. She has also assisted in undertaking public participation processes for renewable energy projects.

Zinzi has previous working experience in geo-informatics and geographic information systems (GIS). She has two years of experience working with GIS, which she has gained whilst working on projects for the private sector. She has specialised in spatial analysis, data processing and mapping, while her technical responsibilities include inter alia the evaluation of data, digitising, editing, and converting spatial data and non-spatial data from various formats and manipulating data in Esri ArcMap, GeoMedia and QGIS.

Since joining Zutari, she has worked extensively on renewable energy projects, during which she assisted in compiling basic assessment reports, environmental management programmes and undertaking the public participation process. She is also involved in various feasibility screenings for photovoltaic (solar PV) projects in Limpopo and works as an environmental compliance officer (ECO) for green buildings projects in Gauteng.

Qualifications
BSc (Hons) Geography and Environmental Science
BSc Geography

Professional registrations
Member, Golden Key International Honour Society (GKIHS)
Member, Geo-Information Society of South Africa (GISSA)
Member, International Association for Impact Assessment (IAIA)

Specialisation
Geographic information systems (GIS) and telecommunication masts

Years in industry
3

Relevant experience

Strengthening of TR1/1, South Africa, Western Cape, Provincial Government of the Western Cape (PGWC): Department of Transport and Public Works (DTPW), 06/2018 - 01/2026, Environmental Consultant

Zutari was appointed by the Department of Transport and Public Works: Roads Infrastructure Branch of the Western Cape Government (WCG) to undertake full engineering services of the strengthening of TR1/1 – George to Oudtshoorn. Zutari provided advice on the scope of work and also provided design input and deliverables to the client, as well as procurement and contract administration. Responsible for finalising the final basic assessment report for submission to the competent authority.

God's Window Skywalk, South Africa, Mpumalanga, Motsamay Tourism Group (Pty) Ltd, 08/2021 - 06/2025, Environmental Consultant

Zutari was appointed to conduct an environmental impact assessment (EIA) and water use licence application (WULA) for the proposed construction of a skywalk and skybridge at God’s Window in the Mpumalanga Province. These services are to ensure compliance with the National Environmental Management Act (Act No. 107 of 1998) (NEMA), National Water Act, 1998, as well as other associated or required environmental authorisations. Responsible for compiling the project EMPr and coordinating the public participation process for the basic assessment process.

New Pacaltsdorp reservoir, tower and pump station, South Africa, Western Cape, George Local Municipality, 03/2022 - 06/2024, GIS Consultant

To address the inadequate security of potable water supply in Pacaltsdorp (West), George Municipality required the construction of a new reservoir and pumpstation. Zutari's scope of works entail the management and design for the new 2.5 Ml reinforced concrete reservoir, tower, pump station and interconnecting pipework as well as the design of a new supply main should the existing 315mm Ø supply main be found inadequate. This also includes the management of the documentation and procurement of contractor/s for the civil, mechanical and electrical works; contract administration and site supervision. Responsible for producing maps.

Environmental impact assessment (EIA) and water use licence application (WULA) for the proposed Bierspruit Opencast development at the Amandelbult mine complex, South Africa, Limpopo, Rustenburg Platinum Mines, 03/2019 - 06/2024, Environmental Consultant

Zutari was appointed to conduct an environmental impact assessment and water use licence application for the proposed Bierspruit Opencast development at the Amandelbult mine complex near Thabazimbi in the Limpopo Province. Responsible for assisting with coordinating the public participation process and stakeholder engagement.

Cato Ridge environmental impact assessment (EIA), South Africa, KwaZulu-Natal, Cato Ridge Development Company Ltd, 07/2021 - 12/2023, Environmental Consultant

The Cato Ridge Development is an initiative of the land holder to strategically release land on commercial terms to end users and developers for the development of a large-scale logistics hub and intermodal transport facility. The land holdings comprise 1885 ha of land that is strategically located with high potential for development. Responsible for adapting the impact assessment tables from various specialist reports into the draft EIAr.

Anglo American prefeasibility studies, South Africa, Botswana, Namibia and Zimbabwe, Anglo Corporate Services SA, 07/2021 - 12/2023, Environmental Consultant

Anglo American is aiming for carbon neutrality by 2040 and appointed Zutari for technical advisory services to development an energy strategy for its sites in South Africa, Botswana, Namibia, and Zimbabwe. This strategy needs to provide a procurement perspective per site, in consideration on certain scenarios and criteria to be taken into account, among others: capacity and energy availability, finance, reliability, changing energy landscape, etc. based on taking all the criteria into account. Responsible for undertaking a due diligence exercise for the Great Kei WEF and the Ngxwabangu site.

Environmentally sustainable design (ESD) for KSB Pumps, South Africa, Gauteng, Messaris Wapenaar Consulting Service, 08/2022 - 11/2023, Environmental Control Officer (ECO)

Zutari was appointed for environmentally sustainable design (ESD) services for the major refurbishment of a 2 500 m² office development in Johannesburg to achieve Green Star Certification. Responsible as Environmental Control Officer (ECO), which included monthly auditing for compliance to environmental requirements according to Man-6 Sustainability Green building criteria.

Waste management support, South Africa, Limpopo, Rustenburg Platinum Mines, 07/2021 - 06/2023, Environmental Compliance Officer

Zutari was appointed to assess the waste management practices at Mogolakwena Mine to make recommendations for improvement. This included developing a Waste Management Plan (WMP); conducting site assessments for both internal and external waste facilities including contractors; developing a waste inventory as well as developing and conducting training for four levels within the operations for Mogalakwena Complex (MC). Responsible for conducting an environmental assessment (EA) and environmental management programme (EMPr) audit for the Mogalakwena Fuel Depot.

Improvement and management of gravel roads, South Africa, Western Cape, Provincial Government of the Western Cape (PGWC): Department of Transport and Public Works (DTPW), 05/2020 - 05/2023, Environmental Consultant

Zutari was appointed to assist with the material supply and planning, design and control aspects for the maintenance of gravel roads in the Central Karoo and Eden District Municipalities. Services include engineering geology, environmental studies, materials source identification and project management. Responsible for assisting with closure applications, compiling closure plans and environmental risk reports.

Kokerboom 2, South Africa, Business Venture Investments No 178, 01/2015 - 04/2023, Environmental Consultant

Zutari was appointed by Business Venture Investments, as the independent environmental assessment practitioner to undertake the Part 1 Amendment in terms of the 2014 Environmental Impact Assessment (EIA) Regulations of 2014 (Regulation 29(a)) (as amended) pursuant to the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA). Responsible for coordinating the Public Participation Process and undertaking the part 1 amendment process.

Upgrading of Marakabei-Monontša road, Lesotho, China Geo-Engineering Corporation Lesotho (Pty) Ltd (China Geo), 01/2019 - 04/2023, Environmental Consultant

Zutari is assisting the Lesotho Government in improving the way of life for its citizens, this time by providing detailed design services for the upgrading of Marakabei-Monontša road in Butha-Buthe District of northern Lesotho. As project designer to the Design and Build Contractor, China Geo, Zutari is delivering detailed design, including geometric, materials and pavement design, as well as geotechnical investigations for the road, the bridge and the accompanying drainage structures. Responsible for auditing the construction site and writing an addendum report to the existing environmental management programme (EMPr).

Ilanga Emoyeni, South Africa, Windlab Developments South Africa, 04/2022 - 03/2023, Environmental Consultant

Windlab Developments South Africa (Pty) Ltd appointed Zutari as the independent environmental assessment practitioner (EAP) to undertake the applications for Environmental Authorisation (EA) in terms of the National Environmental Management Act (Act No 107 of 1998) (NEMA) and its Environmental Impact Assessment (EIA)

Regulations (2014 as amended in 2017). Responsible for compiling basic assessment reports for Ilanga Emoyeni PV2 and PV3 and the environmental management programmes (EMPr) for the Ilanga Emoyeni Solar Suite.

Environmental and social impact assessment (ESIA) for Serengeti Energy Baoma Project Phase II, Sierra Leone, CEMMATS Group Limited, 09/2022 - 01/2023, Environmental Consultant

Serengeti Energy contracted CEMMATS Group Ltd, in association with Zutari, to conduct an Environmental and social impact assessment (ESIA) study for its solar power plant construction and operation. Responsible for ensuring that all the relevant documents are reviewed, according to the IFC performance standards, by the different specialists.

Seriti KHU Coal Improvement, South Africa, Mpumalanga, Seriti Power (Pty) Ltd, 01/2022 - 12/2022, Environmental Consultant

Zutari was appointed to undertake a coal quality improvement pre-feasibility study (PFS) to further develop the options identified by the concept study and select a go-forward case that is sustainable and cost-effective as an option that would provide the Kendal “240” quality specification from the Khutala complex and supplementary Seriti Power equity coal. Responsible for environmental screening.

Sibanye photovoltaic plant: amendment of environmental authorisation (EA), South Africa, Gauteng, Sibanye Gold Limited, 08/2021 - 12/2022, Environmental Consultant

Zutari was appointed to amend conditions of the environmental authorisations (EAs) for the Sibanye Gold solar PV plant and associated powerlines that were issued in 2017. These processes include ecological walkdown assessments of the solar PV plant and powerlines, revision of the environmental management plans for both components, and an application for a basic assessment to authorise an additional EIA “listed activity”. Responsible for compiling the basic assessment report (BAR), environmental management programme (EMPr) and public participation documentation.

Water feasibility study for a combined treatment plant at Arnot Coal Mine closed colliery, South Africa, Seriti Coal (Pty) Ltd, 01/2020 - 10/2022, Environmental Consultant

Zutari was appointed to undertake a feasibility study for further definition of the integrated water management plan (IWMP) for the collection of excess water and the treatment and discharge of reclaimed water from the Arnot mining area, as well as the management of all waste material produced due to the implementation of the IWMP. Responsible for the compilation of the DW901, DW902, and Section 21(A) water use licence applications (WULAs) on the Electronic Water Use Licence Application and Authorisation System (e-WULAAS).

Simba CM Projects, South Africa, Simba (Pty) Ltd, 05/2021 - 10/2022, Environmental Consultant

Zutari was appointed to undertake an impact assessment process is to identify, assess and report on any potential impacts that the proposed project may have on the receiving environment, if implemented. The investigation outcome described how impacts on the biophysical and socio-economic environment can be, as far as possible, enhanced or mitigated and managed as the case may be. Responsible for compiling a NEMA inquiry for the Shakaskraal IP to CNG piping burner modifications.

Housing maintenance at Mogalakwena Mine, South Africa, Rustenburg Platinum Mines, 10/2021 - 09/2022, Social People Assistant

Zutari was appointed to undertake condition assessments of mining houses for the community living the Ga-Puka village and working at the Mogalakwena Mine. Responsible for conducting condition assessments.

Traffic impact assessment (TIA) for a solar photovoltaic (PV) plant at Mogalakwena Mine, South Africa, Rustenburg Platinum Mines, 07/2020 - 04/2022, Environmental Consultant

Zutari was appointed to undertake a traffic impact assessment (TIA) for a proposed 70-90 MW solar farm at Mogalakwena Mine in the Limpopo Province. The TIA was undertaken as part of an application for an environmental authorisation scoping phase of the legislated impact assessment process. Responsible for compiling sub-consultancy agreements for specialists, public participation documents and authorisation reports for submission to the competent authority.

Venetia Diamond Mine independent power producer (IPP) project, South Africa, Cresco Project Finance, 04/2021 - 04/2022, Environmental Consultant

Zutari was appointed as the environmental assessment practitioner (EAP) to undertake the application for an environmental authorisation for an independent power producer (IPP) for Venetia Diamond Mine in Limpopo. Responsible for assisting with the public participation process (PPP) during the environmental implementation review (EIR) phase and assisting with the compilation of the environmental management programme (EMPr) report.

In diversity there is beauty and there is strength.

MAYA ANGELOU

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