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Cato Ridge Land Development and Release project

Initial Obstacle Limitation Surface Assessment Report

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1 Introduction

1.1 Project Background

This report intends to communicate the findings of a conceptual Obstacle Limitation Surface (OLS) assessment conducted to verify any foreseeable airspace impact posed by land use options development on the Proposed Development Phases 1, 2 and 3 located in Cato Ridge near the western boundary of the eThekwini Metropolitan Municipality, KwaZulu Natal and north of the N3 highway. Cato Ridge is located approximately 51 km west of Durban via the N3 and 29 km southeast of Pietermaritzburg. The R103, which acts as an alternative route between Durban and Pietermaritzburg (Refer to Figure 1), bisects the Study Area. A central railway line, the Natal Corridor (Natcor), also divides the area and provides general accessibility to the informal and agricultural areas in the north and south. The applicant, Cato Ridge Development Company (CRDC) has an operational manganese smelter (Cato Ridge Works) to the west of the Study Area. KwaXimba settlement is immediately north of the Study Area, and the Inchanga settlement lies 3 km to the east of the Study Area.

1.2 Methodology

The OLS analysis is performed on the aerodromes identified by the Web-Based National Screening Tool located within 8 km of the three phases of the Proposed Development. These identified aerodromes are then visually inspected via Bing Maps to confirm the existence of the aerodrome and to form a perception of the operational status of the aerodrome.

Based on the methodology described, this OLS assessment relates to the Sunset Ridge Farm (Emoyeni) Airstrip, the Light Flight Airstrip, the Grass Roots Airfield, Cato Ridge Airfield and the identified Model Aeroplane Sites.

The OLS analysis conducted is based on International Civil Aviation Organization (ICAO) Annex 14 Standards and Recommended Practices (SARPS), the ICAO Airport Services Manual (Doc 9137) Part 6 and the South African Civil Aviation Authorities (SACAA) Technical Standards and Guidance Material.

The findings of this report are to be considered in addition to the 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.

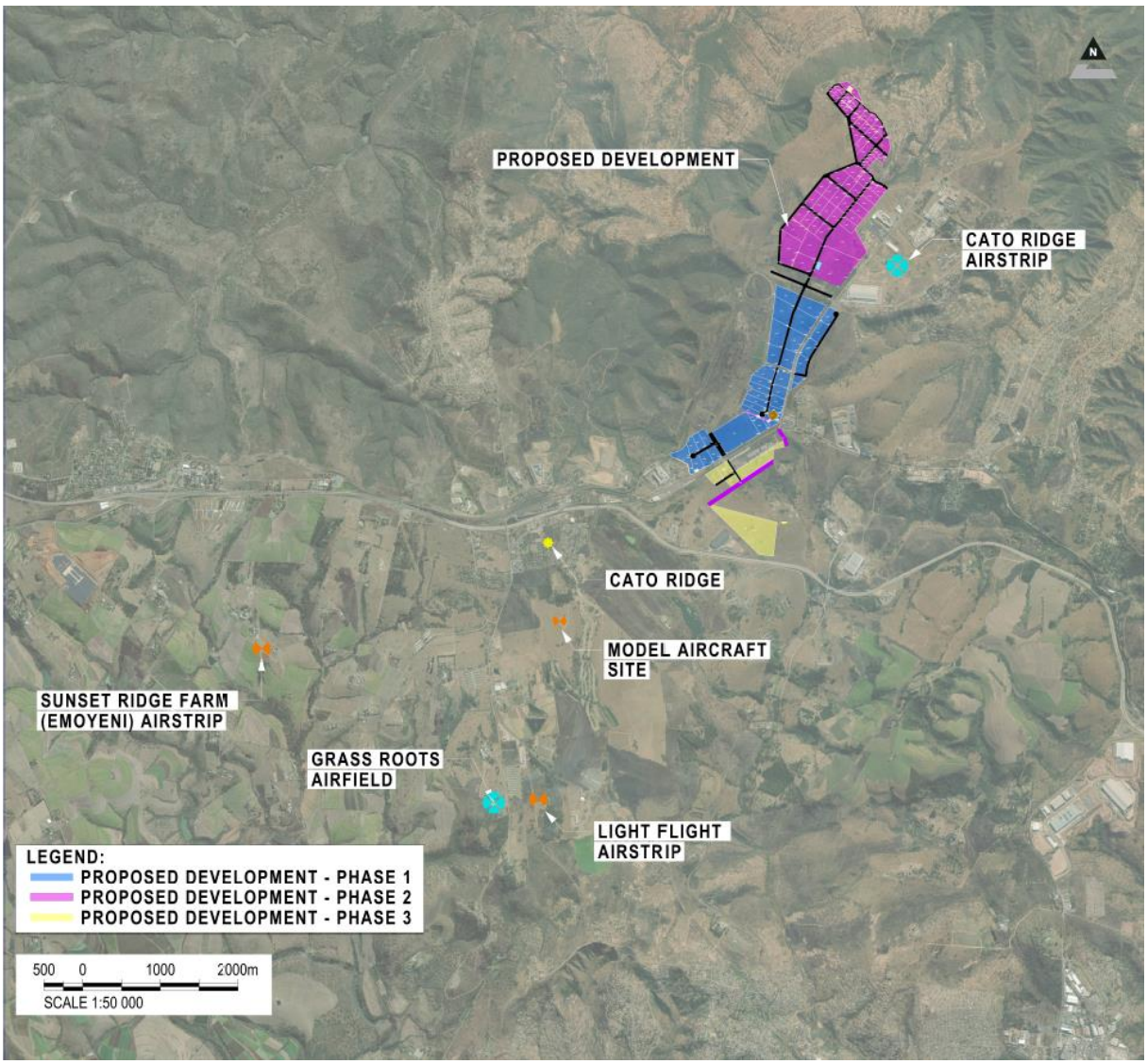


Figure 1: Locality map

2 Obstacle Limitation Surface Assessment

The OLS are a series of surfaces that define the limits to which objects may project into the airspace around aerodromes, which are required to be maintained free from obstacles. It is used to ensure the safe operation of aircraft within and surrounding an aerodrome. Figure 3 illustrates the different OLS surfaces.

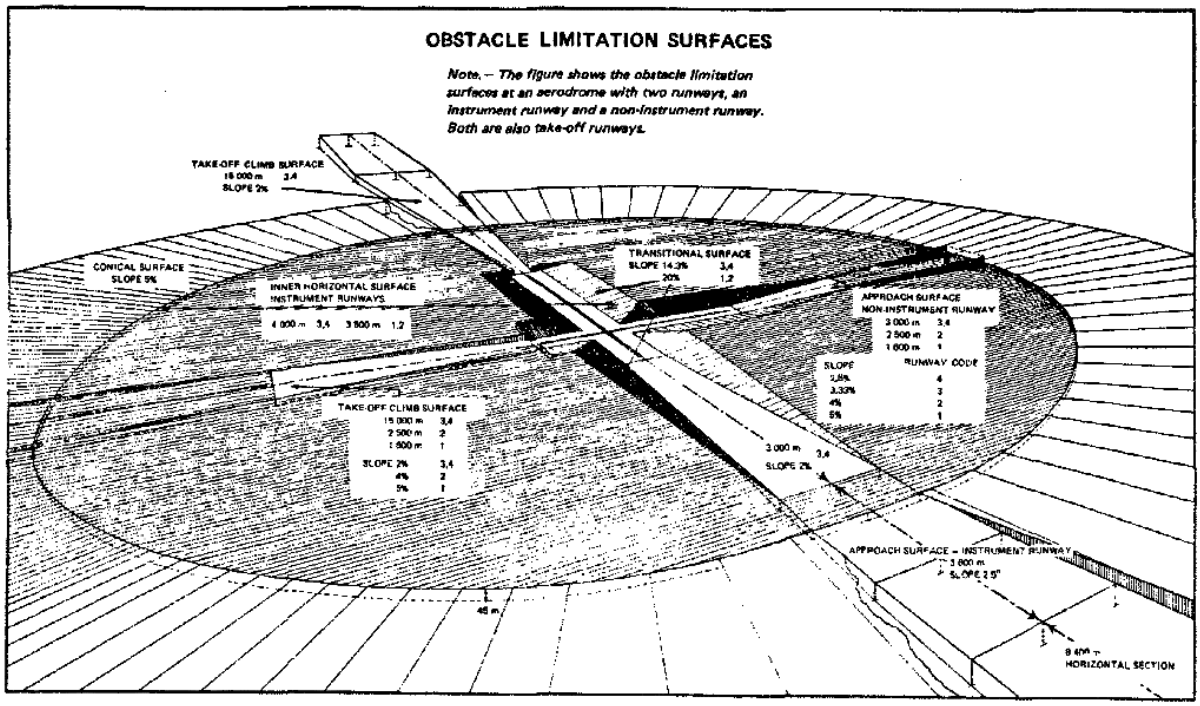


Figure 2: OLS illustration (Source: ICAO Airport Services Manual, Part 6 Control of Obstacles)

2.1 OLS Descriptions

The airfields identified in this study are all assumed to be Non-instrument Code 1 Approach runways. Desktop investigation showed no indication of instrumentation. Code 1 runways refer to the aerodrome reference code in terms of the design aircraft reference field length, which is less than 800m. In terms of OLS, the runway code number defines various parameters that govern the dimensions and slopes of the OLS surface. According to ICAO Annex 14, paragraph 4.2.1, the following surfaces are considered for a non-instrument approach runway, as is the case with all the identified aerodromes:

- Transitional Surfaces;
- Approach Surfaces;
- Inner Horizontal Surface; and
- Conical Surface.

A brief description of each surface with assessment findings is presented in the following sections in respect to Non-instrument Code 1 Approach runways. Refer to ICAO Annex 14 for more information.

2.1.1 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. The transitional surface then extends along the length of the strip parallel to the runway centreline. It also comprises of an upper edge located in the plane of the inner horizontal surface.

The Transitional surface slope for code 1 non-instrument runway conditions is 20%, defined lower from the edge up to the Inner Horizontal Surface.

2.1.2 Approach 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 the 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 1.

Table 1: Approach surface parameters

Parameters	Approach Surface
Length of Inner Edge	60 m
Divergence (each side)	10%
First Section Length	1600 m
First Section Slope	5%
Second Section Length	N/A
Second Section Slope	N/A
Horizontal Section Length	N/A
Horizontal Section Slope	N/A
Total length	1600 m

2.1.3 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. The elevation of the surface is measured from a defined elevation datum for such a purpose.

2.1.4 Conical Surface

The conical surface is the surface that 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 1 runway, the Conical Surface is at 35 m above the Inner Horizontal Surface. The divergence slope from the lower plane coincident with the Inner Horizontal Surface to the upper limit is 5%.

2.2 Sunset Ridge Farm (Emoyeni) Airstrip OLS Assessment

The airstrip is located ~5 km South-West from the boundary of the three phases of the Proposed Development. The assumptions and considerations adopted in the OLS assessment are provided in Table 2.

Table 2: Sunset Ridge Farm Airstrip assessment assumptions and considerations

	Assumption/Consideration	Reference
Airfield status	Operational, Not registered with SACAA	Confirmation obtained during site investigation
Airfield use	Light and microlight flights	Confirmation obtained during site investigation
Runway 1 length	~520 m	Visual observation - Bing Maps
Runway 1 width	~15 m	Visual observation - Bing Maps
Aerodrome reference code (Conservative approach)	1A	ICAO Annex 14
Aerodrome instrumentation category	Non-Instrument	Visual observation - Bing Maps and information available from the ATNS website
Runway 2 length	~200 m	Visual observation - Bing Maps
Runway 2 width	~15 m	Visual observation - Bing Maps
Aerodrome reference code (Conservative approach)	1A	ICAO Annex 14
Aerodrome instrumentation category	Non-Instrument	Visual observation - Bing Maps and information available from the ATNS website

With the incorporation of the assumptions and considerations stipulated in Table 2, Figure 3 illustrates the conditions of the OLS at the Sunset Ridge Farm Airstrip relative to the Proposed Development.

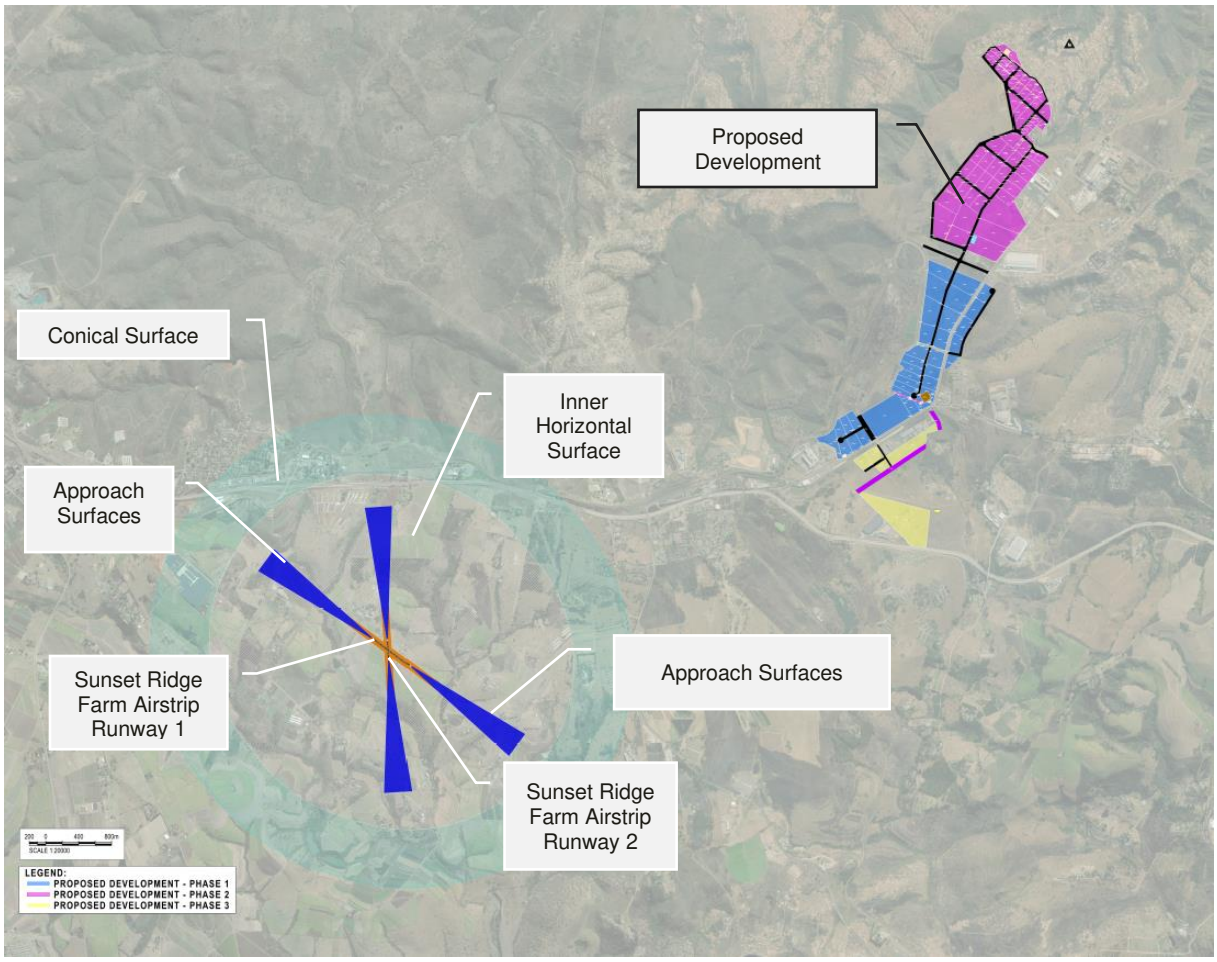


Figure 3: Sunset Ridge Farm OLS Assessment

Figure 3 shows that all three phases of the Proposed Development fall outside of the extent of the airfield's OLS. It is therefore deduced that land use development on the three phases of the Proposed Development will not impact any aircraft activities taking place at the Sunset Ridge Farm Airstrip.

2.3 Light Flight Airstrip OLS Assessment

The airstrip is located ~4 km from the boundary of the three phases of the Proposed Development. The following assumptions and considerations were adopted to conduct the OLS assessment:

Table 3: Light Flight Airstrip assessment assumptions and considerations

	Assumption/Consideration	Reference
Airfield status	Operational, Not registered with SACAA	Confirmation obtained during site investigation
Airfield use	Flight training, general aviation and recreational aviation	Confirmation obtained during site investigation
Runway 1 length	~750 m	Visual observation - Bing Maps
Runway 1 width	~30 m	Visual observation - Bing Maps
Aerodrome reference code (Conservative approach)	1C	ICAO Annex 14

	Assumption/Consideration	Reference
Aerodrome instrumentation category	Non-Instrument	Visual observation - Bing Maps and information available from the ATNS website

Figure 4 shows that the three phases of the Proposed Development fall outside the extent of the Light Flight Airstrip OLS boundaries.

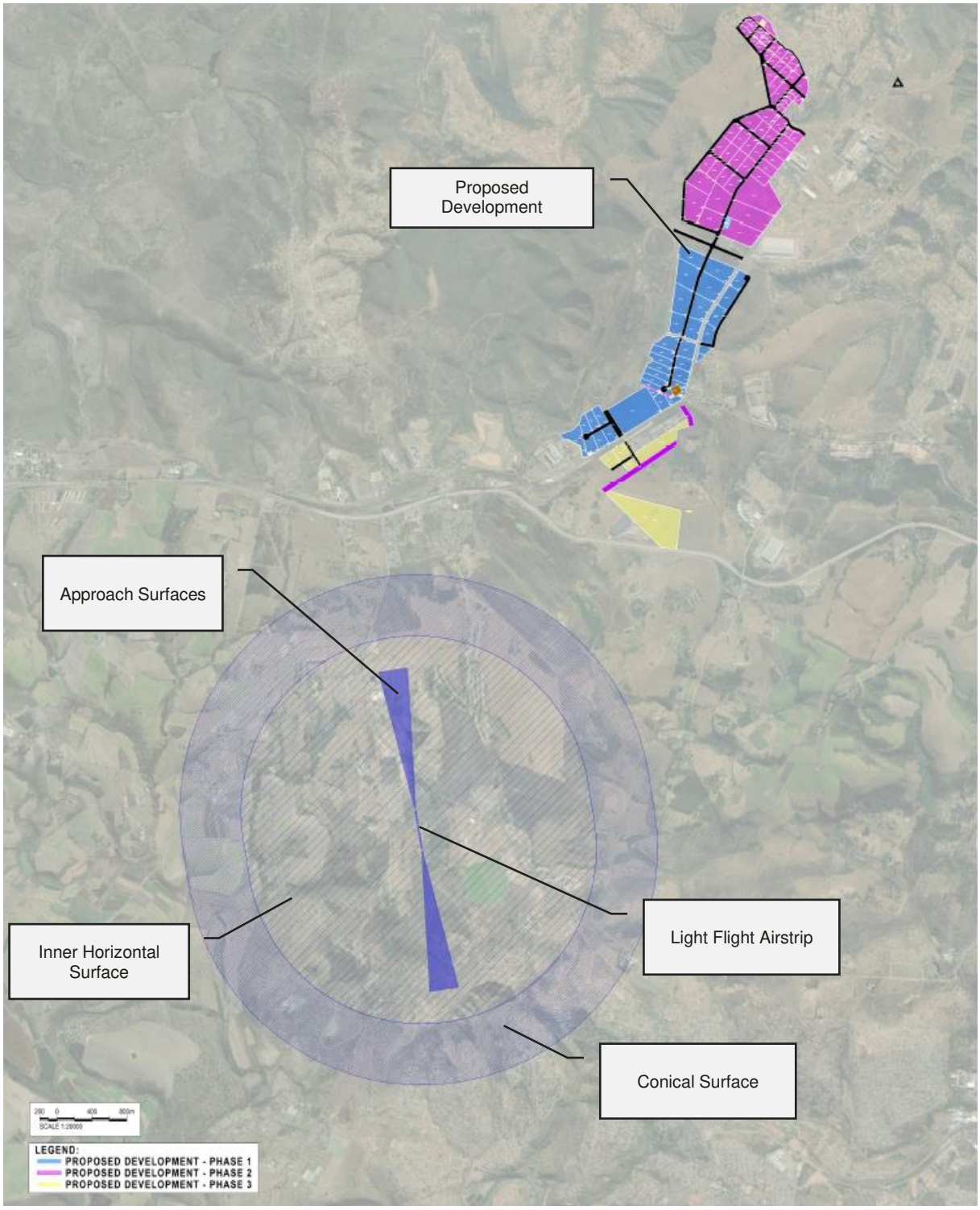


Figure 4: Light Flight Airstrip OLS Assessment

2.4 Grass Roots Airfield OLS Assessment

Grass Roots Airfield is located ~2km South-West of the Proposed Development extent. The airfield is not operational and the current use of the facility is unknown.

2.5 Cato Ridge Airfield

Cato Ridge Airfield is located within ~1km East of the Proposed Development. The airfield is not operational as per the client's observation and desktop studies. No airspace considerations of the airfield were taken due to the operational status of the airfield.

2.6 Model Aeroplane Sites

The SACAA stipulates that Remotely Piloted Aircraft cannot be operated within 50 m or less from any persons or group of persons, and any property without the permission of the property owner. Figure 5 shows that the sites are located ~2.3 km away from the Proposed Development. Given that it is unlikely that the model aeroplanes would be flown beyond 50 m from the sites, this implies that the land use development of the three phases of the Proposed Development will have no impact on the Model Aeroplane Sites operations and activities.

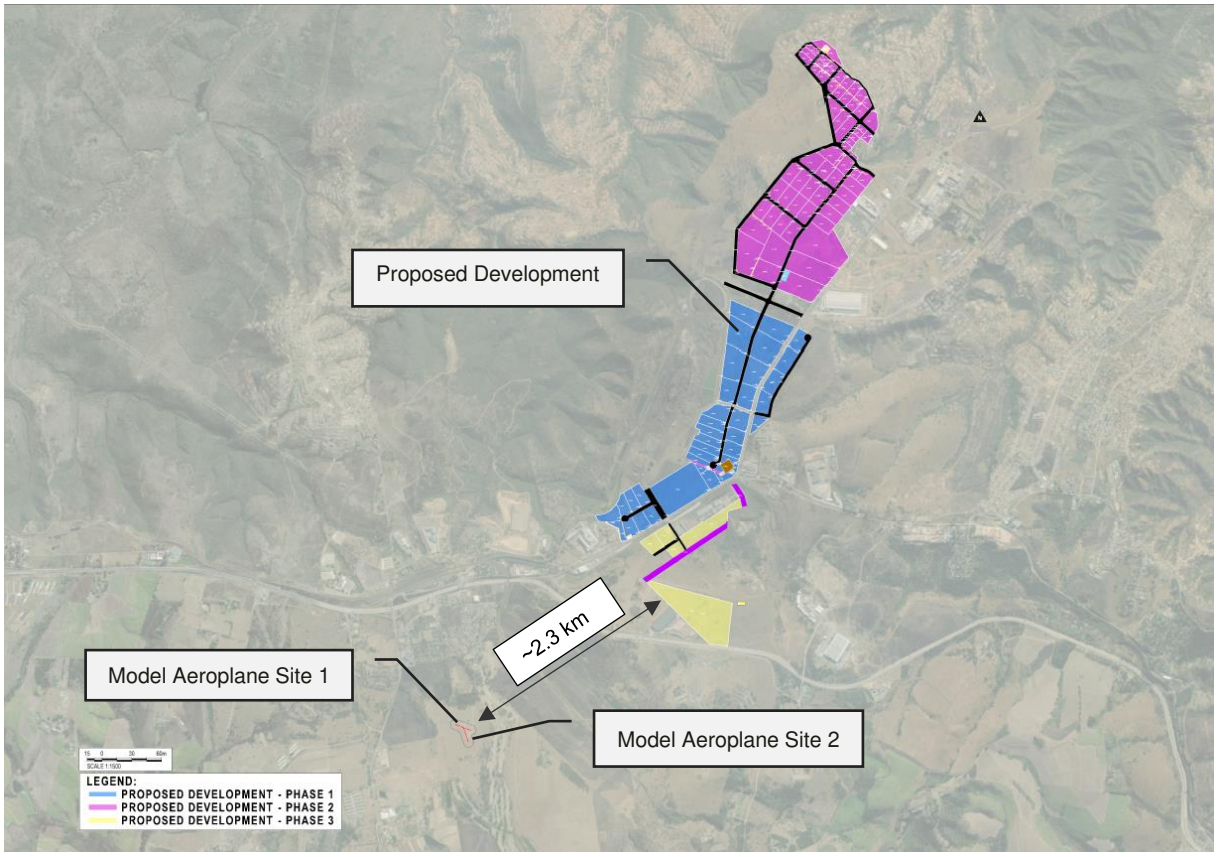


Figure 5: Location of Model Aeroplane Sites relative to the three phases of the Proposed Development

2.7 Conclusions and Recommendations

The undertaking of these high-level concept OLS assessments indicates that the land use development on the three phases of the Proposed Development will not cause any protrusions on the OLS of the identified airfields.

3 Civil Aviation Compliance Assessment

3.1 Introduction

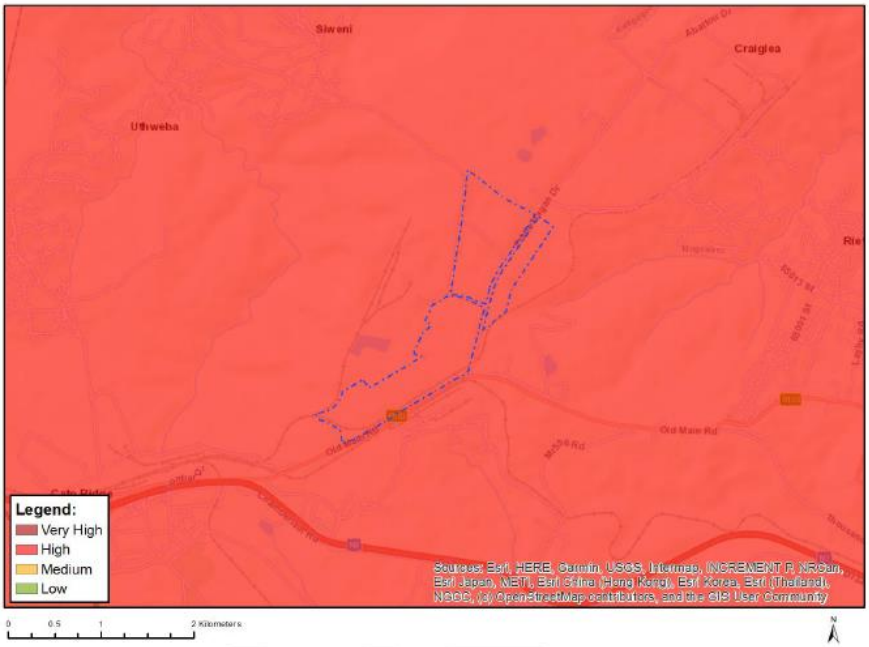
Government Notice No. 320 of 20 March 2020 stipulates the protocol for assessment and minimum report content for impacts on civil aviation installations, for activities that require environment authorisation. The reporting requirements are associated with the level of sensitivity as identified by the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

An assessment was conducted from the information provided and from available aerial imagery to identify nearby civil aviation installations, within a radius of 8 km of the three phases of the Proposed Development, with the potential of being impacted.

3.2 Results of the Web-Based National Screening Tool

Figure 6 to Figure 8 illustrate the proposed development footprint overlaid on the civil aviation sensitivity map as generated by the web-based national screening tool (DFFE, 2022).

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY



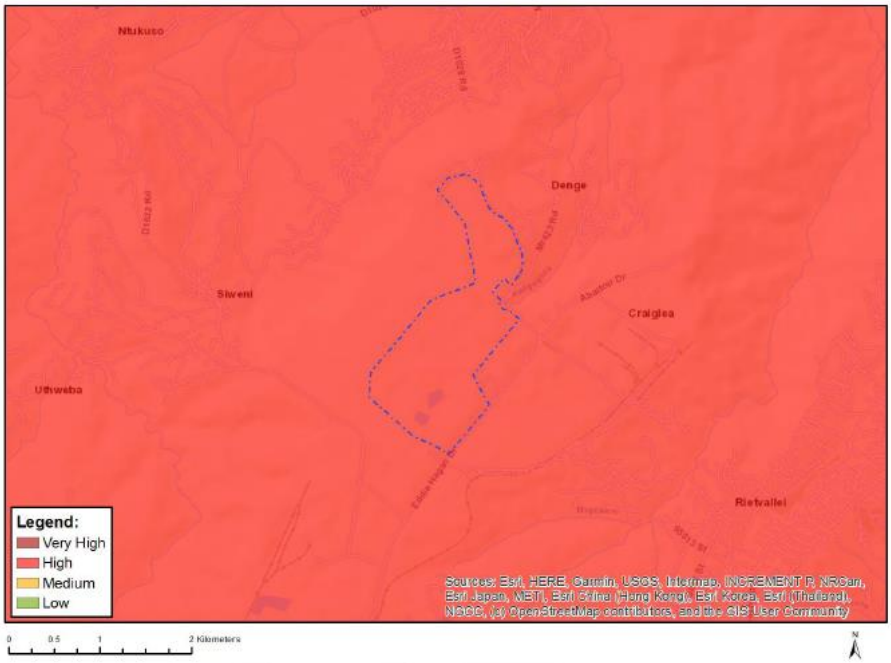
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Within 8 km of other civil aviation aerodrome

Figure 6: Web-based National Screening Tool – Civil Aviation Sensitivity - Proposed Development Phase 1 (DFFE, 2022)

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY



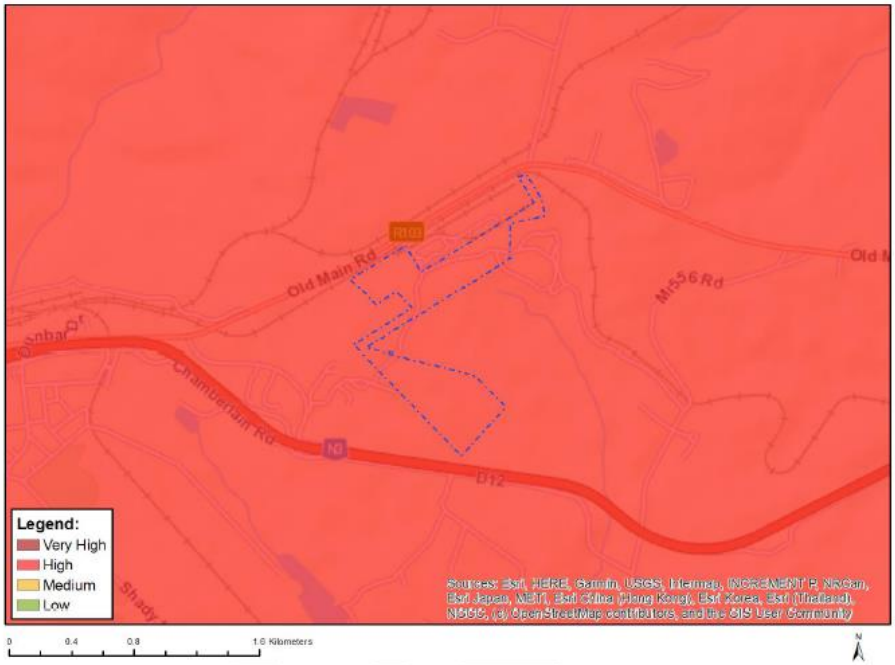
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Within 8 km of other civil aviation aerodrome

Figure 7: Web-based National Screening Tool – Civil Aviation Sensitivity - Proposed Development Phase 2 (DFFE, 2022)

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

Figure 8: Web-based National Screening Tool – Civil Aviation Sensitivity - Proposed Development Phase 3 (DFFE, 2022)

Findings illustrated in Figure 6 to Figure 8 indicate the high sensitivity feature of the three phases of the Proposed Development in relation to identified airfields. Our analysis shows agreement with the High sensitivity rating.

The OLS assessment conducted however indicates no interaction between any of the three phases of the Proposed Development and the OLS of the identified airfields.

3.3 Conclusions and Recommendations

Although the three phases of the Proposed Development fall within 8 km of a civil aviation aerodrome, as per the results of the web-based national screening tool, and are attributed a high sensitivity rating, the OLS assessment indicates that the land use development on the three phases of the Proposed Development will not impact the four identified airstrips/ airfields.

This analysis does not include ATNS requirements or radar interference considerations. If deemed necessary by the SACAA, 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	Patrick Killick - *Environmental Assessment Practitioner*	Patrick is senior environmental practitioner and project leader with 18 years of significant on-site experience in the supervision, hands-on management and monitoring of construction related environmental impacts and occupational health and safety associated with the construction projects. His impact assessment experience arose from a variety of projects and industries whilst undertaking a various environmental impact studies and other regulatory and planning processes for various developments within South Africa, Angola, Mozambique, Tanzania and Namibia. His project experience runs deeper in the areas of municipal bulk water supply and wastewater treatment infrastructure, waste management facilities (including H:h landfill class), bulk thermal power generation (gas, HFO and coal), utility scale renewable energy projects (wind and solar), seawater desalination (SWRO) including associated marine, estuarine and coastal issues, open pit mining (coal and uranium) and associated mining infrastructure.	• Environmental Assessment Practitioners Association of South Africa (EAPASA) - Registered Environmental Assessment Practitioner • International Association for Impact Assessment (IAIA) Member • MPhil (Environmental Management) • BTech (Forestry) • NDip (Forestry)
Verifier	Wynand Schoeman – *Aviation specialist*	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
Reviewer	Yolandi Foord – *Technical Director*	Yolandi is a registered professional engineer specialising in airport planning and engineering design with extensive previous experience in highway planning and engineering design.	• Engineering Council of South Africa (ECSA) – Professional Engineer

		Yolandi's involvement in projects extends across all project stages as from project management to conceptual design and planning through to contract documentation production and construction supervision. She has been responsible for technical design elements, concerned with the geometric design of highways, roads and airports, as well as civil services.	• Engineering Honors - Transportation • Bachelor in Engineering - Civil
Author	Tony Kandolo - *Airports Engineer*	Tony is a candidate engineer specialising in airport engineering design. He has been involved in numerous greenfield and brownfield projects in several African countries which have enhanced his knowledge of ICAO SARPs, national aviation regulations and technical standards.	• Engineering Council of South Africa (ECSA) – Candidate Engineer • Bachelor in Engineering - Civil

Annexure A: Curriculum Vitae

Patrick Killick

Senior Environmental Consultant

Summary

Patrick is based in Zutari's George office as a senior environmental practitioner and project leader with significant on-site experience in the supervision, hands-on management and monitoring of construction related environmental impacts and occupational health and safety associated with the construction of dams, roads, pipelines, underground works, weirs, and residential villages whilst employed on the Berg Water Project.

Patrick entered the environmental field via construction phase environmental management on the Berg River Project, where his duties included the supervision and hands-on environmental management, site remediation, monitoring of construction related environmental impacts and occupational health and safety. This experience was gained on a range of interrelated projects including dams, roads, pipelines, underground works, weirs, and residential villages, which includes four years' experience in a full-time environmental management officer role near Franschhoek, Western Cape. As a result, he is well-versed in the site management systems, processes and the practicalities of environmental site management. His duties as practical environmental manager also included converting guidelines and policy into practice and procedure.

Patrick's impact assessment experience arose from a variety of projects and industries whilst undertaking a various environmental impact studies and other regulatory and planning processes for various developments within South Africa, Angola, Mozambique, Tanzania and Namibia. His project experience runs deeper in the areas of municipal bulk water supply and wastewater treatment infrastructure, waste management facilities (including H:h landfill class), bulk thermal power generation (gas, HFO and coal), utility scale renewable energy projects (wind and solar), seawater desalination (SWRO) including associated marine, estuarine and coastal issues, open pit mining (coal and uranium) and associated mining infrastructure. With a keen interest in the technical aspects of the job, Patrick enjoys exposure to each new industry and understanding the technologies, processes and the environmental challenges associated with each.

Patrick also plays a role in the management and development of proposals for various prospects pursued throughout the African continent and contributes to the maintenance of several business planning databases in this regard. He also provides support and guidance to other environmental project leaders on project management related matters.

He obtained a Master's degree in Environmental Management in 2005 from the University of the Free State (UFS) and is a member of the International Association for Impact Assessment South Africa (IAIAsa).

Qualifications
MPhil (Environmental Management)
BTech (Forestry)
NDip (Forestry)

Professional registrations
Member, International Association for Impact Assessment, South Africa (IAIAsa)

Specialisation
Project Leader/Senior Environmental Practitioner

Years in industry
18

Relevant experience

Namies and Wolf Wind farm environmental authorisation (EA) amendments, South Africa, juwi Renewable Energies (Pty) Ltd, 07/2017 - 08/2022, Project Leader

The project entailed the second part of the environmental authorisation (EA) amendment processes to increase the size of the wind turbines that can be deployed on the Namies and Wolf Wind energy facilities. Responsible as Team Lead and EAP for all aspects of the project and overseeing the compilation of EA amendment application, associated amendment report and associated public participation process.

Nuweveld Wind Farm Projects, South Africa, Western Cape, Red Cap Nuweland North (Pty) Ltd, 03/2019 - 12/2021, Project Leader

Red Cap Energy (Pty) Ltd is proposing three wind energy facilities (wind farms) approximately 65 km north of Beaufort West and 30 km south of Loxton along the R381 in the Beaufort West Local and Central Karoo District

Municipalities, in the Western Cape. The project includes the development of an approximately ~120 km 132 kV or 400 kV (132/400 kV) transmission line (gridline) which will connect the proposed wind farms to the Eskom Droërivier substation located south west of Beaufort West. Zutari has been appointed as the independent environmental assessment practitioner (EAP) to facilitate the requisite scoping and environmental impact reporting (S&EIR) processes for all four applications in accordance with the NEMA and associated legislation. The projects included a detailed pre-screening phase used to identify site sensitivities and no-go areas, which informed the preliminary project layout. The layout was then iteratively refined through ongoing specialists, public and authority inputs via a public participation process during the voluntary pre-application scoping phase, and the formal scoping and impact assessment phases. Responsible as Team Lead and EAP for all aspects of the project and overseeing the compilation of environmental impact assessment (EIA) and environmental management programmes (EMPrs) across the four applications, three social and environmental impact assessment (S&EIA) and one basic assessment.

Environmental and social impact assessment (ESIA) and resettlement action plan (RAP) for the Zambeze Coal Mine, Mozambique, Tete, International Coal Ventures Private Limited (ICVL), 11/2015 - 12/2021, Project Manager

Zutari was appointed to develop the environmental and social studies that will enable the licensing of the Zambeze Coal Project. The aim of the project is to provide the client with a sound assessment of the potential impacts of the proposed Zambeze mine development and to demonstrate proposed mitigation or enhancement measures on these to the environmental authority, namely the Ministry of Land, Environment and Rural Development/Ministério da Terra, Ambiente e Desenvolvimento Rural (MITADER). Responsible for project contract and financial management.

Koeris dangerous goods basic assessment and environmental authorisation, South Africa, Northern Cape, SA Mainstream Renewable Power, 10/2018 - 11/2021, Project Leader

Zutari undertook a National Environmental Management Act (NEMA) Part 2 environmental authorisation (EA) amendment for the increase in turbine size and basic assessment (BA) for a temporary above ground diesel storage tank. Responsible as Team Lead and EAP for all aspects of the project and overseeing the compilation of EA amendment application and associated amendment report.

Environmental amendment for the 200 MW Hotazel Solar Park, South Africa, Northern Cape, juwi Renewable Energies (Pty) Ltd, 04/2019 - 11/2021, Project Leader

The project entailed the environmental authorisation (EA) amendment to expand and split the 200 MW solar PV facility and associated infrastructure, including a 100 MWh grid scale battery storage facility on a site near Hotazel in the Northern Cape into two discreet projects. Responsible as Team Lead and EAP responsible for all aspects of the project and overseeing the compilation of EA amendment application and associated amendment report.

Design of Mizingani seawall and promenade, Phase IIA, Zanzibar, Tanzania Ministry of Finance, 11/2013 - 03/2020, EMPr Specialist and ECO

The Revolutionary Government of Zanzibar (RGoZ), through its Zanzibar Urban Services Project (ZUSP), appointed Zutari to lead a consortium of six consultancy companies for the design of the 340 m-long vertical seawall, with a 5 m-wide sea reclamation, along Mizingani Road. Based on design work completed under the Aga Khan Trust for Culture's (AKTC's) technical support, Zutari's scope of work included detailed design of the seawall and promenade; the preparation of construction drawings, specifications, contract packages and tender documents; building condition assessment and review of the environmental and social management plan (ESMP). Responsible for the compilation of a detailed environmental management programme (EMPr) and later appointed to monitor and audit of the project performance against the conditions of authorisation and EMPr.

Water augmentation study for the Bitou Local Municipality, South Africa, Western Cape, Bitou Local Municipality, 10/2009 - 01/2020, Project Leader

The Wadrif 1E Dam scheme was for the augmentation of the bulk water supply to the Plettenberg Bay area. Zutari's project scope focused on the Wadrif 1E off-channel dam and included a basic assessment process for an emergency pipeline and the remainder of the pipeline in terms of the relevant environmental legislation. An application for a licence to store was made in terms of the National Water Act, 1997 (NWA) and a forestry permit application for a drilling site investigation for the Wadrif 1E Dam site and for dam construction. Responsible as Team Lead and EAP responsible for all aspects of the project and compilation of interim monitoring report need to allow for the continuation of the authority's stalled decision making process.

Table Mountain Group (TMG) Aquifer exploratory phase, South Africa, Western Cape, City of Cape Town, 12/2015 - 08/2019, EMPr Specialist

The Table Mountain Group (TMG) Aquifer is an aquifer system with significant storage volume which can provide large bulk water supply for local municipalities and irrigation water for agriculture in the Western Cape and Eastern Cape Provinces in South Africa. Zutari was appointed to manage the exploration of groundwater in the aquifer system in order to establish the potential of the TMG Aquifer as a long-term water resource for the Western Cape. Responsible for contributions to the environmental management programmes (EMPrs) and advisory support and quality management to ECOs.

Wallerawang Closure Project, Australia, EnergyAustralia NSW Pty Ltd, 09/2016 - 06/2019, Team Member

Energy Australia's Wallerawang Closure Project went underway to decommission, deconstruct and rehabilitate the site which formerly housed the Wallerawang Power Station, an ash disposal area and associated infrastructure. The 200 ha Wallerawang Ash Repository comprises Kerosene Vale Ash Repository (KVAR), Kerosene Vale Ash Dam (KVAD), Sawyers Swamp Creek Ash Dam (SSCAD), Lidsdale Cut landfill area, an asbestos repository and infrastructure that services these land uses including a pipeline easement, access tracks, haul roads and water management features. Responsible for the section dealing with assessment, management and mitigation of noise and vibration aspects.

Hotazel Solar Park, South Africa, Northern Cape, juwi Renewable Energies (Pty) Ltd, 05/2016 - 10/2017, Project Leader

Hotazel Solar Farm, owned by juwi Renewable Energies (Hotazel Solar 1 (Pty) Ltd), is proposing the construction of a solar photovoltaic (PV) park and associated grid connection infrastructure near Hotazel in the Northern Cape. Zutari has been appointed to undertake two separate applications for environmental authorisations from the Department of Environmental Affairs (DEA). Responsible as Team Lead and EAP for all aspects of the project and the compilation of all impact assessment documents, environmental management programme (EMPr) and associated public participation process.

Road materials supply strategy, South Africa, Western Cape, Provincial Government of the Western Cape (PGWC): Department of Transport and Public Works, 06/2008 - 07/2017, Team Member/EMP Specialist/ECO Support and Review

The Western Cape Province initiated a proactive approach to identifying and legalising a network of approved pits. Zutari was responsible for prospecting suitable road making materials, sampling, testing, and identifying technically suitable sources to be used for both identified projects and as strategic pits and was responsible for getting all the required approvals. Responsible as Team Member and assisted with the compilation of application documentation, environmental management programmes (EMPrs) and provided ECO support and quality control functions.

Optimisation of Kupferberg landfill site, Namibia, Jan Palm Consulting Engineers (JPCE), 08/2015 - 09/2016, Project Leader

The Kupferberg waste disposal site is currently the only waste disposal facility that serves the City of Windhoek and one of two in Namibia with a hazardous waste component. The City of Windhoek plans to expand the disposal site and service the City of Windhoek for up to 20 years. Zutari was engaged to undertake an environmental impact assessment (EIA) on the project. Responsible as Team Lead and EAP for all aspects of the project and the compilation of all impact assessment documents, environmental management programme (EMPr) and associated public participation process.

Environmental authorisation (EA) amendment for the Kangnas and Koeris wind energy facilities, South Africa, Northern Cape, Mainstream Renewable Power (Pty) Ltd, 02/2016 - 09/2016, Project Leader

Zutari was appointed by Mainstream Renewable Power (Pty) Ltd to undertake two Part 2 amendment and one Part 1 amendment, in terms of the NEMA EIA Regulations, 2014, of an environmental Authorisation for the Kangnas and Koeris Wind Energy Facilities. The amendment centred on a change to the specifications of the proposed wind turbines to allow for a wider turbine specification envelope that permits the new modern turbines models. Responsible as Team Lead and EAP for all aspects of the project and the compilation of all EA amendment documentation and associated public participation process.

Environmental authorisation amendment for the 96 MW Wolf Wind Energy Farm, South Africa, Eastern Cape, juwi Renewable Energies (Pty) Ltd, 04/2016 - 08/2016, Project Leader

Zutari was appointed by juwi Renewable Energies (Pty) Ltd to undertake a Part 2 amendment, in terms of the NEMA EIA Regulations, 2014, of an environmental authorisation for the Wolf Wind Energy Facility near Wolwefontein in the Eastern Cape. The amendment centred on a change to the specifications of the proposed wind turbines, increase blade tip and increasing generation power. Responsible as Team Lead and EAP for all aspects of the project and the compilation of all impact assessment documents, environmental management programme (EMPr) and associated public participation process.

Environmental processes for the Kronos Solar Park, South Africa, Northern Cape, juwi Renewable Energies (Pty) Ltd, 11/2014 - 11/2015, Project Leader

Zutari was appointed to undertake five individual environmental processes to assess the environmental impacts associated with the three proposed 75 MW photovoltaic (PV) facilities and two 132 kV overhead transmission lines at the Kronos Solar Park near Copperton. Responsible as Team Lead and EAP for all aspects of the project and the compilation of all impact assessment documents, environmental management programme (EMPr) and associated public participation process.

Kangnas Wind Energy Facility (WEF) and photovoltaic EIAs, South Africa, Western Cape, Mainstream Renewable Power, 03/2012 - 11/2015, Project Leader

The project involved updating the final environmental management programmes (EMPrs) and layouts for the

approved 140 MW Kangnas Wind Energy Facility (WEF) and associated infrastructure as part of the project financial close ahead of construction for submission to the Department of Environmental Affairs (DEA). Responsible as Team Lead and EAP for all aspects of the project and the compilation of all impact assessment documents, environmental management programmes (EMPr) and associated public participation process.

Outeniqua Wind Farm, South Africa, Western Cape, Juwi Renewable Energies (Pty) Ltd, 03/2013 - 10/2015, Project Leader

The project involves conducting an environmental impact assessment process in terms of the National Environmental Management Act for a 39 MW wind energy facility (WEF). Responsible as Team Lead and EAP for all aspects of the project and the compilation of all impact assessment documents, environmental management programme (EMPr) and associated public participation process.

Wolf Wind Farm assessment, South Africa, Eastern Cape, juwi Renewable Energies (Pty) Ltd, 08/2013 - 10/2015, Project Leader

Juwi Renewable Energies (Pty) Ltd (juwi) proposes to construct a wind energy facility (WEF) and associated infrastructure, with a generation capacity of 80 MW on farms near Wolwefontein in the Eastern Cape with 132 kV or 220 kV overhead transmission lines for transmission and distribution. Responsible as Team Lead and EAP for all aspects of the project and the compilation of all impact assessment documents, environmental management programme (EMPr) and associated public participation process.

Muxima shopping centre environmental impact assessment (EIA), Angola, Luanda, SWB comercio e industria, 07/2014 - 10/2015, EMPr Specialist

Zutari was appointed for the environmental impact assessment (EIA) for Muxima, a new shopping retail centre in Viana with more than two 5 000 m² of retail space. Responsible for various impact assessment documents, environmental management programme (EMPr) and stakeholder management plan undertaken to IFC standards.

Knysna-Bitou scheme feasibility, South Africa, Western Cape, Eden District Municipality, 01/2013 - 09/2015, Specialist

The Knysna and Bitou local municipalities within the Eden District Municipality recently experienced the worst drought in more than 100 years. The need to consider cross-boundary projects was identified in the Eden District Municipality's regional bulk water supply master plan study. The project involved the identification of the water resource and bulk water requirements of both Knysna and Bitou local municipalities for the next 20 years and exploring the technical and economic viability of integrating the bulk water supply systems serving the towns of Knysna and Plettenberg Bay. Responsible for assisting with the identification of options, screening of options using MCDM and compiling a results report on the preferred options for further development.

Distillery Road upgrade for Drakenstein Municipality, South Africa, Western Cape, SKCMasakhizwe Engineers, 10/2013 - 07/2015, Project Leader

The project entailed the provision of an environmental control officer (ECO) during the upgrading of Distillery Road in Wellington. Responsible as Team Lead and EAP for all aspects of the project and the compilation of all impact assessment documents, environmental management programme (EMPr) and associated public participation process.

Volksrust wind energy facility constraints analysis, South Africa, Mpumalanga, juwi Renewable Energies (Pty) Ltd, 02/2015 - 06/2015, Project Leader

The project entailed and investigation of the potential environmental and social constraints affecting the feasibility of a wind energy facility in Volksrust. Zutari undertook a preliminary desktop assessment of the following areas: heritage (archaeology and cultural heritage); botany; avifauna; freshwater resources; bats; and agricultural potential. Responsible as Team Lead and compiled the screening and constraints analysis report including GIS inputs.

Rössing Desalination Plant, Namibia, Erongo Region, Rio Tinto Rössing Uranium Limited, 07/2014 - 03/2015, Project Leader

This project consisted of a 10 Ml/d seawater desalination plant, north of Swakopmund to supply the water needs of Rössing Uranium Mine. Responsible as the Zutari Team Lead and EAP for some aspects of the project and the compilation of all impact assessment documents, environmental management programme (EMPr) and associated public participation process.

Second bridge on the River Niger, Nigeria, Niger, Nigeria Sovereign Investment Authority (NSIA), 05/2014 - 12/2014, Team Member

The Federal Government of Nigeria proposed to construct a second bridge across the River Niger between Onitsha and Asaba and selected the Julius Berger-AIIM Consortium as the preferred bidder. Zutari was appointed on behalf of AIIM to undertake an environmental and social impact assessment (ESIA) required in terms of the Environmental Decree No 86 of 1992, in accordance with the International Finance Corporation (IFC) guidelines, which included a resettlement action plan (RAP). The aim was to ensure regulatory compliance with the Nigerian environmental legislation and achieve the highest possible compliance with Equator Principles (EPs). Responsibilities included

client liaison; coordination of the ESIA process, including 16 specialists; writing and reviewing key aspects of the environmental management programme (EMPr).

Pilot catchment management plan: Kyoga water management zone, Uganda, The World Bank, 12/2012 - 07/2014, Team Member

The pilot catchment management plan (CMP) fits into a larger development framework and coordinated water-related investment strategy for the region, as well as within the context of development goals and key water-related policies of Uganda. Zutari was appointed for water planning and management, and adopted an integrated water resources management (IWRM) approach for this project. Responsible for contributing to various sections of the catchment management plan and assisted with the compilation of the overall document.

Franschhoek traffic circle concept design, South Africa, Western Cape, Stellenbosch Local Municipality, 04/2013 - 06/2014, Project Leader

The Stellenbosch Municipality appointed Zutari to provide full professional services relating to the upgrading of intersections on the main road through Franschhoek, the R45/Provincial Main Road 191 (MR191). The appointment included the preliminary design, detailed design, documentation and construction supervision stages. Responsible as Team Lead and EAP for all aspects of the project and the compilation of all impact assessment documents, environmental management programme (EMPr)and associated public participation process.

450 MW Khanyisa coal fired power station, South Africa, Mpumalanga, AngloGold, 09/2010 - 01/2014, Consulting Team Member

The project entailed the compilation of construction and operations phase environmental management programmes (MP's) for a 450 MW coal-fired power station and associated infrastructure, including ash disposal dumps. Responsible for the development of the environmental management programme (EMPr).

Constraints analysis for a wind farm, South Africa, Eastern Cape, juwi Renewable Energies (Pty) Ltd, 09/2013 - 12/2013, Project Leader

Zutari was appointed by juwi Renewable Energies (Pty) Ltd to undertake an environmental constraints analysis on three potential sites near Aberdeen in the Eastern Cape, to be considered for the development as Wind Energy Facilities. Zutari undertook a preliminary desktop assessment of the following areas: heritage (archaeology and cultural heritage); botany; avifauna; freshwater resources; bats; and agricultural potential. Responsible as Team Lead and compiled the screening and constraints analysis report including GIS inputs.

Mineral exploration environmental management plan (EMP) for License Areas No 3450L and 3451L, Mozambique, Tete, Coal India Africana Limitada, 02/2012 - 04/2013, Consulting Team Member

The project entailed the compilation of an environmental management plan (EMP) for mineral exploration drilling (diamond core and percussion drilling) in Licence Area no's 3450L and 3451L of the Moatize coal fields. Responsible for compilation of the exploration drilling environmental management programme (EMPr).

Environmental and socio-eonomic impact assessment (ESIA) for a coal-fired power station, Namibia, Erongo Region, NamPower, 09/2011 - 04/2013, Consulting Team Member

To meet the increasing power demands and reduce Namibia's dependency on South Africa for electricity, the Namibia Power Corporation (NamPower) proposed an increase in its electricity-generating capacity. The national peak is approximately 550 MW, of which a significant portion is imported, especially during the dry season. This is when the flow of the Kunene River is far below what is needed to operate the Ruacana Power Station on full base load. The proposed power station, Erongo, is set to contribute to the base load supply and assist in stabilising the grid under load and supply fluctuations. The project aimed to assess the impact of a 150/300/800 MW coal-fired power station with associated coal stockyard, an ash disposal facility and transport systems to deliver coal. This project aimed to investigate one of the alternative sites from the previous study in Walvis Bay and two new sites in the vicinity of Arandis, east of Swakopmund. Responsible for the development of the environmental management programme (EMPr).

Environmental socio-economic impact assessment (ESEIA) for Erongo Power Station, Namibia, Erongo Region, Namibia Power Corporation (NamPower), 09/2011 - 04/2013, EMPr Specialist

The Namibia Power Corporation (NamPower) proposed an increase in its electricity-generating capacity to meet increasing power demands and reduce Namibia's dependency on South Africa. Zutari undertook an environmental socio-economic impact assessment (ESEIA) for the construction of the proposed Erongo Power Station to obtain authorisation from the Directorate of Environmental Affairs and the Ministry of Environment and Tourism. This ESEIA aimed to assess the impact of a 150/300/800 MW coal-fired power station with associated coal sto ckyard, an ash disposal facility and transport systems to deliver coal. Responsible for compiling the project environmental management programme (EMPr).

Construction of a bulk water supply scheme to the town of Aussenkehr, Namibia, Namibian Water Corporation, 12/2011 - 03/2013, Consulting Team Member

The project comprised the compilation of a life-cycle environmental management plan for the bulk water supply scheme for the town of Aussenkehr. Responsible for the development of the environmental management

programme (EMPr).

Mine life extension for Rössing Uranium Mine, Namibia, Rio Tinto Rössing Uranium Mine Limited, 06/2007 - 12/2011, Consulting Team Member

The project comprised the compilation of a social and environmental management plan (SEMP) for various activities associated with the life extension of Rössing Uranium Mine. This included the extension of the open pit operations, acid manufacturing plant, ore sorting plant, extended waste rock disposal areas, and tailings facilities, as well as a bulk sulphur handling facility in the port at Walvis Bay. Responsible for the development of the environmental management programme (EMPr).

Upgrading the Keurbooms pump station, abstraction works and rising main, South Africa, Western Cape, Bitou Municipality, 11/2009 - 12/2011, Environmental Control Officer (ECO)

Zutari was appointed by the Bitou Municipality to compile an environmental management plan (EMP) associated with the proposed urgent upgrading of the Keurbooms Pumpstation, abstraction works and a 650 m length of 500 mm diameter steel rising raw water main. Responsible for compiling an EMP associated with the proposed urgent upgrading of the Keurbooms pump station, abstraction works and a 650 m length of 500 mm diameter steel rising raw water.

Pipeline for reclamation of water from wastewater treatment works (WWTW), South Africa, Western Cape, Beaufort West Municipality, 02/2007 - 06/2011, Consulting Team Member

Zutari was appointed for the facilitation of the required environmental authorisation and waste licence for the upgrading of the wastewater treatment works in Merweville. Responsible for routine environmental auditing to confirm compliance with the environmental authorisation (EA) and environmental management programme (EMPr) as required by ECO role.

Decommissioning of the Sonae Novobord fibreboard factory, South Africa, Western Cape, Sonae Novobord (Pty) Ltd, 06/2009 - 06/2011, Consulting Team Member

Zutari was appointed by the Sonae Novobord to compile an environmental management plan (EMP) and act as the environmental control officer (ECO) for the decommissioning of their factory in George Industria, with a focus on the recovery and handling of salvageable materials and the lawful recovery and disposal of hazardous wastes and contaminated soil. Responsible for authoring various documents including the environmental impact assessment (EIA), public consultation materials and environmental management programmes (EMPRs). Also fulfilled the role as ECO overseeing the decommissioning process and ensuring compliance with the environmental authorisation (EA) and EMPr.

15 Ml/d Emergency desalination plant in Mossel Bay, South Africa, Western Cape, Mossel Bay Municipality, 05/2010 - 01/2011, Project Manager, Lead Consultant and Environmental Control Officer (ECO)

The project involved the compilation of a Section 24G application in terms of the National Environmental Management Act for an emergency 15 Ml/d seawater reverse osmosis plant as a result of more than 1:150 year drought situation in the Southern Cape, inclusive of a construction phase environmental management plan (EMP) and environmental control officer (ECO) services. Responsible as Team Leader and EAP for the compilation of a Section 24G retrospective environmental impact assessment (EIA) and also the ECO, auditing compliance against the provisional environmental management programme (EMPr).

New sulphuric acid storage tank at the Rössing Uranium Mine, Namibia, Rio Tinto Rössing Uranium Mine Limited, 02/2010 - 06/2010, Consulting Team Member

Commissioned by Rössing Uranium to compile of a social and environmental management plan (SEMP) for the proposed new 15 Kt sulphuric acid storage tank located within the mine precinct. Responsible for compilation of the impact assessment documentation and environmental management programme (EMPr).

Social and environmental management for mineral exploration drilling plan, Namibia, Rio Tinto Rössing Uranium Mine Limited, 11/2008 - 04/2010, Consulting Team Member

Commissioned by Rössing Uranium Limited to compile a social and environmental management plan (SEMP) for the proposed exploration drilling activities within the Namib-Naukluft Park and mine licence area. Responsible for compiling the exploration drilling environmental management programme (EMPr).

Creosote and CCA timber pole treatment facility, South Africa, Outeniqua Pale (Pty) Ltd, 06/2007 - 03/2010, Consulting Team Member

Responsible for assisting with an environmental impact assessment (EIA) for the decommissioning of an Outeniqua Pale Creosote and CCA pole treatment facility in Groot Brak and re-establishing it on a new site in Albertinia. Appointed by Outeniqua Pale (Pty) Ltd to compile of a construction, operation and decommission phase environmental management plan (EMP) for a Creosote and CCA pole treatment facility in conjunction with a basic assessment report (BAR).

Social and environmental management plan for a bulk sulphur handling facility, Namibia, Rio Tinto Rössing Uranium Mine Limited, 04/2008 - 12/2009, Consulting Team Member

Commissioned by Rössing Uranium to compile of a social and environmental management plan (SEMP) for the proposed bulk sulphur importation, stockpiling and handling facility in the port of Walvis Bay. Responsible for co-compilation of the impact assessment documentation and environmental management programme (EMPr).

Emergency upgrading of Keurbooms rising main and pumps, South Africa, Western Cape, Bitou Municipality, 10/2009 - 11/2009, Lead Consultant

Appointed by the Bitou Municipality to undertake an Emergency application for the upgrading of a 295 m section of perished pipeline, with 500 mm diameter steel pipe and the upgrading of pump impellors to increase abstractions from 100 l/s to 120 l/s out of the Keurbooms River. Responsible to compile an EMP and to function as the ECO for the Emergency application and subsequent upgrading of a 295 m section of perished pipeline, with 500 mm diameter steel pipe and the upgrading of pump impellors to achieve a greater abstraction rate.

Upgrading of the Merweville wastewater treatment works (WWTW), South Africa, Western Cape, Beaufort West Municipality, 05/2009 - 10/2009, Project Manager and Lead Consultant

Zutari was appointed by the Beaufort West Municipality to undertake waste license application involving the compilation of a basic assessment report and a construction, operation and decommissioning phase environmental management plan (EMP) for the upgrading of the Merweville wastewater treatment works (WWTW). Responsible as Team Leader and EAP for the compilation of impact assessment and environmental management programme (EMPr) documents.

Environmental and socio-economic impact assessment (ESEIA) for a proposed NamPower coal-fired power station at Walvis Bay, Namibia, NamPower, 04/2008 - 08/2009, Consulting Team Member

Responsible for acting as Lead Consultant on the ESEIA for the proposed NamPower coal-fired power station at Walvis Bay. This included a site screening and selection process, a scoping study, and an ESEIA, all supported by an environmental management plan (EMP).

40 Ml off-channel reservoir in Karatara, South Africa, Western Cape, Knysna Municipality, 04/2008 - 07/2009, Principle Environmental Consultant/Environmental Control Officer

The project entailed the compilation of the construction phase environmental management plan (EMP) for a 40 000 m² off-channel reservoir, in-channel abstraction works, and associated pipe work. Responsible for acting as environmental control officer (ECO) to supervise the implementation of the environmental management plan (EMP), and undertake compliance monitoring and reporting.

Independent review of environmental impact assessment (EIA) applications, South Africa, Eastern Cape, Department of Environmental Affairs and Tourism (DEAT), 01/2007 - 02/2009, Consulting Team Member

Responsible for assisting with the review of various Section 22 EIA applications in terms of the Environmental Conservation Act (Act 73 of 1989) for the Department of Economic Affairs, Environment and Tourism (DEAET).

Paratus emergency generation facility in Walvis Bay, Namibia, NamPower, 04/2008 - 08/2008, Consulting Team Member

Responsible for assisting with the environmental process management and compiling documentation in relation to a proposed 50 MW heavy fuel oil emergency generation facility located in the industrial port area.

Review of the biodiversity components of municipal spatial development frameworks in the Cape domain, South Africa, Western Cape, South African National Biodiversity Institute (SANBI), 09/2007 - 06/2008, Consulting Team Member

Zutari was appointed to provide an overview of the requirements for biodiversity in SDF's, and an assessment of the current status of biodiversity in these SDF's, as well as to undertake the review as Phase I of a process to improve the input of biodiversity priorities in spatial planning documents and processes. Responsible for reviewing the first phase of a process to improve the input of biodiversity priorities in spatial planning documents and processes.

Overhead power lines between Ha Lejone and the Liqhobong and Kao Diamond Mines, Lesotho, Liqhobong Mining Development Company and Kao Diamond Mine/Plantech Associates, 03/2007 - 02/2008, Consulting Team Member

Responsible for assisting with the compilation of an environmental impact assessment (EIA) for a 38 km, 132 kV overhead power line and associated step-up and step-down substations.

Relocation of Sedgefield's water treatment and supply infrastructure, South Africa, Western Cape, Knysna Municipality, 08/2007 - 12/2007, Consulting Team Member

The project consisted of a basic assessment report for the construction of a 4,5 Ml water treatment works; a 1,8 km, 300 mm rising raw water pipeline; and the decommissioning and upgrading of the Ruigtevlei water treatment works into a pump station. Conduct a Basic Assessment process for the construction or a 4.5Ml water treatment works, a 1,8 km, 300 mm rising raw water pipeline and the decommissioning and upgrading of the Ruigtevlei water treatment works into a pump station. Compilation of the construction, operational and decommissioning phase EMP's for the construction or a 4,5 Ml water treatment works, a 1,8 km, 300 mm rising raw water pipeline and the

decommissioning and upgrading of the Ruigtevlei water treatment works into a pump station. Responsible for assisting with the compilation of project documentation including impact assessment and environmental management programmes (EMPrs).

Chemical storage and distribution facility in George, South Africa, Western Cape, Metsi Chem Ikapa (Pty) Ltd, 06/2007 - 11/2007, Consulting Team Member

The project involved Section 24G retrospective applications for the authorisation of illegal activities relating to the storage of various hazardous chemicals used in the water purification industry, and the development of an associated operational phase environmental management plan (EMP) for incorporation into an ISO14001 environmental management system (EMS). Responsible for compilation of a section 24G retrospective environmental impact assessment (EIA) and environmental management programme (EMPr).

Alien vegetation eradication and rehabilitation, Fancourt Estate, George, South Africa, Western Cape, Fancourt Golf and Country Estate, 05/2006 - 06/2007, Consulting Team Member

Responsible for formulating an alien vegetation eradication and rehabilitation plan for Afromontane Forest for the estate's landholding on Malgas River.

Berg water project, Franschhoek, South Africa, Western Cape, Trans-Caledon Tunnel Authority (TCTA), 03/2004 - 03/2007, Environmental Monitor

The project entailed the construction of bulk water supply infrastructure to service the greater Cape Town metropolitan area which is comprised of the Berg River Dam, large diameter water transfer pipelines, two heavy duty pump stations, a scheme control centre, a balancing dam, several gauging weirs, a diversion weir, an asphalt access road, and an 80-unit residential village with associated bulk services. Responsible for construction supervision, environmental monitoring and reporting, review and assistance with construction method statements, monitoring health and safety aspects and legal compliance, as well as investigating and advising on internal and external entities with regard to environmental issues.

Keurbooms River raw water pipeline, South Africa, Bitou Municipality, 01/2007 - Click or tap to enter a date.**, Environmental Control Officer**

The project consisted of the provision of ad hoc environmental planning, routine audits, and compliance monitoring of the implementation of the environmental management plan (EMP) and ROD conditions of approval for the installation of a 9 km raw water pipeline and the rehabilitation of the construction servitude on completion. Responsible for the monitoring and auditing of the project performance against the conditions of environmental authorisation (EA) and environmental management programme (EMPr).

Timber treatment facility, South Africa, Outeniqua Pale (Pty) Ltd, 01/2008 - Click or tap to enter a date.**, Consulting Team Member**

The project was concerned with the compilation of a construction, operation and decommission phase environmental management plan (EMP) for a Creosote and CCA pole treatment facility in conjunction with a basic assessment report. Responsible for contributions to the environmental management programme (EMPr) and assisting with air quality monitoring.

Mine life extension for Rössing Uranium Mine, Namibia, , 01/2007 - Click or tap to enter a date.**, Consulting Team Member**

Responsible for assisting with the compilation of a social and environmental impact assessment (SEIA) for various activities associated with the life extension of Rössing Uranium Mine, including the extension of the open pit operations, the acid manufacturing plant, the ore sorting plant, extended waste rock disposal areas, and tailings facilities.

2 Ml/d Emergency desalination plant in Plettenberg Bay, South Africa, Western Cape, Bitou Municipality, 12/2009 - Click or tap to enter a date.**, Lead Consultant and Environmental Control Officer (ECO)**

Compilation of a Section 24G application in terms of the National Environmental Management Act for an emergency 2 Ml/d seawater reverse osmosis plant as a result of more than 1:150 year drought situation in the Southern Cape, inclusive of a construction phase environmental management plan and environmental control officer services. Responsible as Team Leader and EAP for the compilation of a Section 24G retrospective environmental impact assessment (EIA) and also the ECO, auditing compliance against the provisional environmental management programme (EMPr).

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**

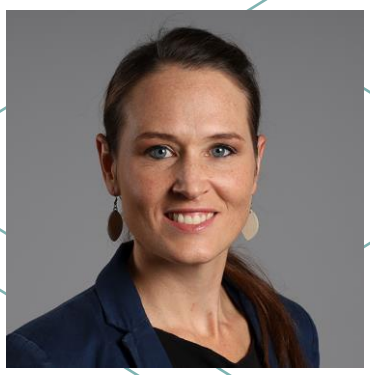
The project entailed the design of the Mohale feeder roads and the Mantoyane-Thaba Kholo plateau in Lesotho. Responsible for determining the expected run-off quantities, and the design of culverts for the roads.

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.



Yolandi Foord

Engineer

Qualifications
BEng (Hons) Transportation
BEng Civil

Professional registrations
Professional Engineer, Engineering Council of South Africa (ECSA)
Member, South African Institution of Civil Engineering (SAICE)

Specialisation
Airports and highway engineering

Years in industry
14

Summary

Yolandi is a registered professional engineer specialising in airport planning and engineering design with extensive previous experience in highway planning and engineering design.

Over the past few years, Yolandi has been involved in a number of challenging and diverse airport projects in South Africa, Principe (Principe and Sao Tomé), Angola, Lesotho, Mozambique and Namibia, which have increased her understanding and application of International Civil Aviation Organization (ICAO) and other internationally recognised standards in designs. She has worked with both private sector and government institution clients, ranging from airport operators such as the Airports Company South Africa (ACSA), Namibian Airports Company (NAC), North West Provincial Government South African Roads Agency Limited (SANRAL) and North West Province Department of Roads to private clients.

Yolandi's involvement in projects extends across all project stages as from project management to conceptual design and planning through to contract documentation production and construction supervision. She has been responsible for technical design elements, concerned with the geometric design of highways, roads and airports, as well as civil services. Over the course of her career, she has experience of working as a project manager, and technical design coordinator in multidisciplinary projects, in construction coordination and managing of liaisons with property owner and stakeholders. She has also been involved in the development of an enterprise development strategy.

Airport-specific experience includes master planning and design of new airports and upgrade and rehabilitation projects for aircraft movement areas (runways, taxiways and aprons). This has ranged from overlays through to re-profiling and the design layout and profiling of new airside pavements and airside infrastructure, e.g. stormwater drainage design.

Geometric design related work applicable to highway/roads design includes, inter alia, the following: design of new single carriageway roads including diamond interchanges, overpasses, underpasses; the upgrading/rehabilitation design of existing roads by provision of climbing lanes, and formal intersections as well as the widening of existing dual carriageways as well as wind farm access roads. She also has three years of site supervision experience which includes: project coordination, calculation of quantities, evaluation of payment certificates, supervision over all related road construction elements, site management and public liaison.

She prepares designs using MicroStation as the drawing environment and InRoads, OpenRoads, AutoTURN® and AviPLAN™ as the geometric design tools. Other software programmes that are used are, amongst others, AutoCAD, MS Projects and Microsoft Office suite programmes.

Yolandi obtained a Bachelor of Engineering (Honours) in Transportation in 2013 and a Bachelor of Engineering in Civil Engineering in 2007, both from the University of Pretoria in South Africa. She is a registered professional engineer with the Engineering Council of South Africa (ECSA) and a member of the South African Institution of Civil Engineering (SAICE). She has also completed Zutari's project leadership programme.

Relevant experience

New Bugesera International Airport (NBIA) WS1, Rwanda, Qatar Airways Group Q.C.S.C, 01/2020 - 07/2022, Project Co-ordinator and Airside Geometric and Drainage Reviewer

The New Bugesera International Airport (NBIA) is located approximately 25 km south east of Kigali and construction works started during July 2017. As part of its expansion into the emerging African continent, Qatar Airways

Group committed to invest in the Rwanda Aviation Sector and agreed to jointly develop the new airport project. The introduction of Qatar Airways/RwandAir as a partner along with the updated flight schedule required a complete re-design of the master plan to facilitate this growth. Zutari was contracted for engineering, procurement and construction (EPC) services, with (Mota Engil Africa MEA) being the contractor on workstream 1 (WS1) on the project. WS1 includes airside works and infrastructure on ancillary buildings. Responsible for design review and project co-ordination, airside geometric and drainage review, and liaison with the detail designers.

ACSA Panel Built Environment, South Africa, Airports Company South Africa (ACSA), 05/2018 - 01/2022, Project Manager

Zutari was appointed by ACSA as part of a Built Environment Engineering Panel to deliver consulting services for electrical, mechanical, structural and civil projects. Zutari's appointments as part of the panel appointment include a traffic impact assessment for George Airport fuel station; the Cape Town International Airport (CTIA) car rental expansion project; CTIA Terminal Building - International Expansion Project, as well as a waste management facility and entrance to the Kimberley Airport. The project's 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 service level agreement finalisation, project planning, internal and external technical co-ordination, client liaison, delivery management, management of project interfaces, assistance with project cost management, geometric design, airside planning, concept development and project scope definition. Specifically responsible as project manager and airport design lead for the concept design of the new cargo precinct at OR Tambo International Airport.

OR Tambo International Airport pavement rehabilitation, South Africa, Gauteng, Airports Company South Africa (ACSA), 06/2012 - 09/2021, Airport 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. The project comprised basic planning, concept development, preliminary design, detailed design and contract documentation for the reconfiguration of stands D39 to D50 to accommodate additional Code F aircraft in a multiple apron ramp system (MARS) configuration with Code C/D aircraft. The project included geometric design of the apron, upgrading of Delta taxiway to conform to the requirements of International Civil Aviation Organization (ICAO) Annexure 14, including paint markings and signage, the relocation of services such as fuel, fire water and apron flood lights. Responsible for project management, concept design, technical design review, project coordination, client liaison, construction estimations, specifications and bills of quantities (BoQs).

ACSA master plans, South Africa, Airports Company South Africa, 02/2019 - 04/2021, Project Leader

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 project co-ordination and development of macro options, as well as ensuring that the client needs are being addressed.

Abeokuta International Airport aeronautical study, Nigeria, Niger, Federal Airports Authority of Nigeria, 01/2018 - 03/2021, Project Leader/Airport Engineer

Ogun State Government required the detail design for the new Abeokuta International Airport – a greenfields project. The airport will provide an alternative for passengers, private aircraft owners and cargo operators in the Lagos area. The project involves runways designed for Code F (CAT II Instrumentation) operations. Its ultimate design includes two runways of 3.9 km each as well as cargo and passenger terminal facilities. In addition, the aprons allow for MARS configurations with a combination of contact and remote aircraft stands. Zutari was appointed for the master planning, siting and conceptual master plan layout development. 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 ARFFS ATC and other airside support facilities. Responsible for project planning, internal co-ordination, project setup, delivery management, ensuring specifications and bills of quantities from all parties are provided, collated and co-ordinated; geometric and drainage design and design co-ordination. As Airport Engineer, responsible for cargo facility concept planning, landside and airside road layout, drainage considerations and co-ordination of bulk services. This included a setup of work breakdown structure and delivery management.

Reconfiguration of stands D39 to D50 at OR Tambo International Airport (ORTIA), South Africa, Gauteng, Airports Company South Africa (ACSA), 09/2016 - 10/2019, Engineer

The project comprised basic planning, concept development, preliminary design, detailed design and contract documentation for the reconfiguration of stands D39 to D50 to accommodate additional Code F aircraft in a multiple apron ramp system (MARS) configuration with Code C/D aircraft. The project included geometric design of the apron, upgrading of Delta taxiway to conform to the requirements of International Civil Aviation Organization (ICAO) Annexure 14, including paint markings and signage, the relocation of services such as fuel, fire water and apron flood lights. Responsible for project management, concept design, technical design review, project coordination, client liaison, construction estimations, specifications and bills of quantities (BoQs).

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 - 05/2017, Engineer

Zutari was 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 for a unit load device (ULD) storage area within the cargo yard. Responsible for the concept, preliminary and detailed design as well as stakeholder engagements and the relevant quotation documentation.

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

Zutari 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 preliminary design, detailed design, design coordination and project management, design specification, bills of quantities (BoQs) and construction estimations.

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

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. Subsequent to this appointment the scope of works 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, OLS and related designs.

Rehabilitation of National Route 11, Section 4 (N11/4) between Newcastle and Ingogo Station, South Africa, KwaZulu-Natal, South African National Roads Agency Limited (SANRAL), 05/2008 - 12/2016, Candidate Engineer (highway design)

Zutari was appointed for the rehabilitation of 15.9 km of National Route 11, Section 4 (N11/4) between Newcastle and Ingogo Station. The work included all relevant site investigations and initiating the environmental management plan (EMP) via a sub-contracted firm; all pavement and geometric designs; the compilation of all contract documents, tender documents and drawings; and the administration and monitoring of the works contract during the construction phase. Responsible for the scoping report, design of preliminary horizontal and vertical alignments and the drainage associated therewith. Also responsible for the compilation and design of typical details, cross-sections, climbing lanes, overpasses, formal intersections and identification of farm portions to be expropriated as well as partly responsible for the quantities of the project.

Upgrading of Road D327 Ganyesa to Vragas, South Africa, North West, North West Department of Public Works, Roads and Transport (DPWRT), 09/2012 - 10/2016, Engineer

The project involved the upgrading of 57 km of Road D327, from Ganyesa to Vragas to Madinonyane, from gravel to surfaced standards. Services included a scoping report, preliminary design, detailed design, contract documentation and site supervision. Responsible for paint marking barrier line analysis and design.

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

Zutari was appointed for the detailed geometric design and preparation of tender documents for the upgrading and rehabilitation of Mejametalana Airport to accommodate CASA CN-235 aircraft, including the refinement of the runway vertical alignment. The 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 apron pavement layout design, oil-water separator design, technical review of geometric and stormwater related designs, project management and design coordination.

Design and supervision for the upgrading of Road K46 (P79-1), South Africa, Gauteng, Gauteng Department of Roads and Transport, 09/2011 - 06/2016, Coordinating Assistant Resident Engineer

The project involved the upgrading of Road K46 (William Nicol), from the PWV 5 (Jukskei River) to National Route 14 (N14) along a stretch of approximately 5 km, to a dual carriageway. Zutari was appointed for the detailed design and construction supervision of the entire upgrade, including extending the carriageway from Km 3.137 to Km 7.24 and providing an additional climbing lane up to Km 8.070. Mainly responsible for the liaison and coordination between the various contractors, project managers, consultants, property owners (inclusive of unresolved proclamation issues), service providers and all interested and affected parties (I&APs) of the various projects during the site supervision phase. Also responsible for setting up and managing the site management system, site supervision and calculation of quantities and compilation of interim payment certificates as well as for the design and site supervision for the relocation of the following services: water trunk mains, sewer line, Telkom, Eskom, Neotel and Dark Fibre Africa (DFA). Also involved in the redesign of the layout, setting out, contour drawings and

cross section of Road K46 due to the addition of an extra lane to each travelled way of the dual carriageway.

Project management services for Rio Tinto Coal Mozambique (RTCM), Mozambique, Rio Tinto Coal Benga, 09/2012 - 11/2015, Engineer

Zutari was appointed to assist with the implementation of capital sustaining projects for Rio Tinto Coal Mozambique (RTCM). Responsible for the preliminary and detailed geometric design of an intersection and access road to Rio Tinto Coal mine yard.

Condition assessment of Príncipe International Airport, , HBD Vida Boa Limited, 01/2010 - 09/2015, Engineer

The island nation of São Tomé and Principe consists of two volcanic islands in the Gulf of Guinea. Zutari was appointed to assess the existing condition of the runway at Príncipe International Airport and to investigate 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 and recommendations. Zutari also carried out the site supervision during the construction phase of this project. Responsible for technical project coordination between the designers and the engineers on site as well as checking designs before drawings are issued to site.

Improvements to National Route 1 Section 21: between the Brakfontein and Flying saucer (R21) interchanges, South Africa, South African National Roads Agency Limited (SANRAL), 12/2006 - 08/2015, Assistant Resident Engineer

As part of the Gauteng Freeway Improvement Project (GFIP), Zutari was appointed for the design and contract administration on the section of road between the Brakfontein and R21 Interchanges. Roadworks included additional lanes and widening the existing lanes in both freeway directions, as well as upgrading three interchanges. The structural work comprised the widening of six existing bridges and the construction of four new bridges. Responsible for geometric design and paint marking design as well as supervision over construction of stormwater, pavement layers, road markings, small structures, traffic safety and review of payment certificates including management of the opening of John Vorster Intersection.

Rehabilitation of airside pavement at OR Tambo international Airport (ORTIA), South Africa, Gauteng, Airports Company South Africa (ACSA), 06/2012 - 08/2015, Engineer

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 for a five-year period. Additional services provided entailed an assessment of the airside holding positions of all the taxiway and runway intersections. Responsible for geometric design, storm water analysis, quantity estimation and design review. Also responsible for the development of an enterprise development strategy for the project.

Audit of Principe Runway International Civil Aviation Organisation (ICAO) compliance, São Tomé and Príncipe, HBD STP - Investimentos Turísticos, Unipessoal, Lda, 10/2010 - 05/2014, Engineer

Zutari investigated possible upgrades to the airport to enable the safe landing and take-off of a Bombardier Global Express as per International Civil Aviation Organisation (ICAO) standards. The project also entailed an investigation of the upgrading of 25 km of roads on the island. Zutari 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 the design review, project and design coordination and providing technical support to site staff.

Order of magnitude (OoM) and feasibility studies for Rio Tinto's Tete East tenements, Mozambique, Tete, Rio Tinto Zambeze, Lda, 12/2012 - 09/2013, Candidate Engineer

Zutari was appointed to provide consultancy services in engineering studies for the order of magnitude (OoM) study for Rio Tinto Zambeze, Lda's (RTZL's) Tete East tenements. Responsible for the preliminary design of the horizontal and vertical alignments for a haul road as an alternative to a railway line.

Upgrading and rehabilitation of Mejametalana Airport, Lesotho, Lesotho Ministry of Public Works and Transport, 11/2009 - 05/2010, Engineer

Zutari was appointed for the detailed design and preparation of tender documents for the upgrading and rehabilitation of Mejametalana Airport to accommodate CASA CN-235 aircraft. The 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. Proposed rehabilitation and upgrade strategies for the ancillary airside pavements, namely the taxiways and aprons, were also addressed. Ancillary designs included the drainage design to manage stormwater on the runway strip and the assessment of the airfield ground lighting (AGL). Responsible for geometric design review, stormwater analysis and project coordination.

Design and construction supervision for Provincial Road 115, Section 1 (P115-1), South Africa, North West, North West Province Department of Transport, Roads and Community Safety, 01/2007 - 02/2010, Highway Engineer

The project was completed in a joint venture (JV) partnership with TN Molefe Consulting Engineers (Pty) Ltd, with Zutari (previously Aurecon) as the leading firm. The project entailed the construction of approximately 10 km of road Provincial Road 115, Section 1 (P115-1) as well as on- and off-ramps from the National Route 4 (N4) to Road R565 and two diamond-type interchanges (taking future developments in the area into account). One carriageway (right hand side (RHS)) of a future dual carriageway forms part of the current design (intended for construction) whilst the total design has to cater for the construction of the future left hand side (LHS) carriageway. Zutari was appointed for the detailed design, including roads, intersections, bus stops, drainage and related facilities such as roadside furniture as well as for the construction supervision. Mainly responsible for the preliminary and detailed design, identifying farm portions influenced by the design, typical details, cross-sections, access roads, geometric design of Goedgedacht interchange Ramps B and C and N4 Ramp C, P2-3, drainage and related roadside furniture, including the related quantities, as well as tying in with existing infrastructure.

Scoping report and detailed design of Road D108, South Africa, North West, North West Province Department of Transport, Roads and Community Safety, 01/2009 - 09/2009, Candidate Engineer (highway design)

The project entailed a feasibility study and detailed design for the rehabilitation of 27 km of Road D108 between Provincial Road 16, Section 2 (P16-2) and Road D1325, including the design of a bypass to avoid heavy traffic through the urban area. The detailed design includes the revision of the vertical alignment and the provision of formal intersections, bus stops, bridges, drainage and related facilities such as speed calming measures and roadside furniture. Pedestrian safety was a main objective since the road passes an informal settlement. Responsible for the survey quotation document, preliminary and detailed design of the horizontal and vertical alignments of Road D108 and all associated drainage. Also responsible for the vertical alignment of Km 14.800 to Km 26.700, including 13 intersections, an existing road-over-road bridge and a new road-over-rail bridge. Also involved in the compilation and design of typical details, cross-sections, interchanges and access roads as well as for the vertical and horizontal alignment of one of the bypass alternatives.

Tony Kandolo

Civil Engineer

Qualifications
BEng Civil

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
5

Summary

Tony is a junior civil engineer at Zutari, where he has been involved in a variety of airport related and other projects. His design involvement in several of the concept designs for midfield and greenfield projects included the identification of the ideal runway location by performing WindRose analysis, the calculation of the obstacle limitation surfaces (OLS) for the runway, placement of electrical signage and the basic geometric design of a runway based on the International Civil Aviation Organization (ICAO) Annexure 14.

He has been involved in the master planning of a network of airports for the North West Province in South Africa, where his contribution included high level visual assessment of the airports, project presentation to North-West University (NWU) students as well as airport site visit coordination.

He is proficient in preparing designs in MicroStation and AutoCAD as the drawing environment and uses Inroads and AviPLAN as the geometric and simulation design tools. Other software programs that are used on an ad-hoc basis are, amongst others, WindRose PRO, Word, Excel and PowerPoint.

During his career Tony has been involved in design projects in numerous countries, including Nigeria, South Africa, Australia, the Democratic Republic of the Congo (DRC) and Rwanda.

Tony is currently pursuing a Master's degree in Project Management. He obtained a Bachelor of Engineering in Civil Engineering from the University of Pretoria, South Africa, in 2016. He is registered as a candidate engineer with the Engineering Council of South Africa (ECSA), is an associate member of the South African Institution of Civil Engineering (SAICE) as well as a member of the Golden Key International Honour Society.

Relevant experience

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

Zutari was appointed for the maintenance work on taxiway and apron of the airport. Responsible for paint marking design.

EDF RMPPP Technical advisor, South Africa, Eastern Cape, EDF Renewables (Pty) Ltd, 10/2020 - 02/2022, Geometric Engineer

Zutari was appointed by EDF Renewables (EDF) to undertake preliminary engineering services for the proposed Dassiesridge Wind Farm, located in the Eastern Cape in South Africa. The preliminary engineering services are to support finalising a proposed plant layout and size for tender as well as to identify any engineering concerns that may have an impact on the feasibility and constructability of the proposed project. The preliminary engineering services include a preliminary wind turbine foundation design. The Gi included scoping, drilling, and test pitting as well as laboratory testing. Responsible for preliminary road geometric design.

Jalingo Airport rehabilitation and upgrades, Nigeria, Taraba, Nigeria Taraba State Ministry of Transport, 03/2020 - 12/2021, Airports 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). Responsible for airside geometric design, earthworks modelling and paint marking design.

Airports Company South Africa (ACSA) panel appointment, South Africa, Gauteng, Airports Company South Africa (ACSA), 05/2018 - 05/2021, Junior Civil Engineer

Zutari was appointed as part of a built environment engineering panel to deliver consulting services for electrical, mechanical, structural and civil

projects. Zutari's appointments as part of the panel include a new cargo facility for OR Tambo International Airport (ORTIA), carrying out a traffic impact assessment (TIA) for George Airport fuel station, the Cape Town International Airport (CTIA) car rental expansion project, the expansion of the international terminal at CTIA, as well as a waste management facility and entrance to the Kimberley Airport. Responsible for assisting the principal engineer in developing the concept design of the new cargo precinct at ORTIA, including earthwork modelling of airside service roads.

Rehabilitation of airside pavement infrastructure at OR Tambo International Airport (ORTIA), South Africa, Gauteng, Airports Company South Africa (ACSA), 06/2012 - 03/2021, Junior Civil Engineer/Assistant Site Supervisor

Zutari 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 assisting the principal engineer with drawings setup, assisting with the conceptual design of realignment of airport service road and the tracking of vehicles on service road. Also responsible for developing the ground vehicle traffic accommodation plan design for tender stage, assisting the principal engineer in generating tender drawings, and later undertaking the role of assistant supervisor, which entails quality control during construction, producing any on-site designs in case of inability to follow and implementing construction drawings.

Infrastructure master plan report for the GiETAF Special Economic Zone (SEZ), Gambia, SVA Mauritius, 05/2018 - 01/2021, Civil Engineer

Zutari was appointed to compile a master plan report of the existing infrastructure on site and the infrastructure required to make the 160 ha GiETAF Special Economic Zone (SEZ) a self-sustainable, mixed-use development. The development is situated next to Banjul Yundum International Airport and Africa's trade route. Zutari completed high level spatial planning design and advised the town planner regarding the spaces required for water and sanitation, stormwater, solid waste, electrical and street lighting, and telecommunication management. Road reserve and servitude widths where also compiled to allow space for the conveyance of all the above-mentioned services from/to the end user and generation area and vice versa. A costing exercise was completed to give the client an idea of the financial order of magnitude (OoM). Responsible for providing counsel relating to aviation consideration in the development of the master plan.

Design review and construction supervision for the New Bugesera International Airport (NBIA), Rwanda, Bugesera Airport Company (BAC), 08/2017 - 09/2020, Junior 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 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 reviewing the runway vertical alignment design and the provisional design and the placing of the passenger boarding bridge (PBB). Also involved in the processing and modelling of the drone survey used for construction progress records as well as assisting the principal engineer with drainage calculations. Further duties included the vertical and horizontal preliminary design of runway extension as well as the preliminary earthworks design (modelling) for runway extension section.

Melbourne Airport Terminal 2 (T2) make-up positions, Australia, Victoria (VIC), Australian Pacific Airports (Melbourne) Pty Ltd (APAM), 07/2019 - 09/2020, Junior Engineer

Aurecon was appointed to develop the concept design phase for Terminal 2 (T2) outbound make up position capacity at Melbourne Airport. Responsible for testing and simulating different apron configurations for temporary apron stand upgrades.

Rehabilitation of the runway of the airfield serving Sunrise Dam Gold Mine, Australia, Western Australia (WA), AngloGold Ashanti Limited, 11/2018 - 05/2020, Civil Engineer

The project entailed reviewing the design elements required for the runway pavement rehabilitation at the airfield that serves the Sunrise Dam Gold Mine in Laverton, which was showing signs of distress prior to the end of its design life. The site was visited and it was determined that the current runway surfacing was failing, and to a lesser extent, the structure of the pavement was indicating signs of distress. A testing regime and remediation options were recommended to the client, together with indicative costings. Aurecon was then appointed as independent reviewer as part of a follow-up phase to review and comment on the pavement and geometric design for the runway's upgrade. Responsible for reviewing the runway and taxiway geometric designs to ensure compliance with Manual of Standards Part 139 - Aerodrome.

Perth Airport master plan, Australia, Western Australia (WA), Perth Airport Pty Ltd (PAPL), 11/2018 - 12/2019, Civil Engineer

Aurecon was appointed to provide airport planning services for the Perth Airport master plan. Responsible for the simulation of several passenger boarding bridge scenarios for the upgrading of three airport stands using AviPLAN.

Reconnaissance and pre-feasibility study for pre-identified hydropower sites in the Lubudi Region, Democratic Republic of the Congo, Tembo Power Ltd, 01/2016 - 12/2019, Civil Engineer

Zutari was appointed to advise Tembo Power on the development of seven pre-identified sites for hydropower plants in the Lubudi Region, namely Dikolongo, Dipela, Kadiva, Kamatanga, Kambudji, Kawa and Kayo. Upon completion of the reconnaissance study, Tembo Power appointed Zutari to carry out the pre-feasibility study of six of the seven sites, namely Kawa, Dikolongo, Kamatanga, Kambudji, Kayo and Dipela. The scope includes a desktop study, own studies, site visits, a geological assessment of the sites, flow measurements, the installation of gauge stations and a meteorological station, pre-feasibility design, management of the LiDAR survey, detailed hydrological studies, preliminary network integration possibilities and reporting. Responsible for liaising between the Zutari site members and local stakeholders in French to ensure efficient and coherent communication.

Aeronautical study for the Abeokuta International Airport, Nigeria, Niger, Federal Airports Authority of Nigeria (FAAN), 01/2018 - 08/2019, Junior Civil Engineer

Zutari 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. Involved in the concept and preliminary design of the airside movement areas, including the design of runway vertical alignment, and assessment of Obstacle Limitation (OLS) to ensure compliance of the International Civil Aviation Organization (ICAO) Annexure 14 Standards and Recommendations. Also responsible for the runway length calculation and the wind analysis design to determine the runway orientation, the detailed design of the vertical and horizontal alignment of runway, and generating of runway, taxiway and apron paint marking, as well as generating, setting up and reviewing construction drawings.

Airside upgrading design works at the King Shaka International Airport (KSIA), South Africa, KwaZulu-Natal, BMK Consulting Engineers, 03/2017 - 08/2018, Graduate Civil Engineer

The project involved airside upgrading design works at the King Shaka International Airport (KSIA) in Durban. Zutari 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. Zutari 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 tracking the aircraft movement on the apron and taxiway, fillet design and tracking, assisting with the positioning of the electrical signage and drawings setup.

North West Province aviation master plan, South Africa, North West, Department of Community Safety & Transport Management (DCS&TM), 04/2017 - 07/2018, Graduate Civil Engineer

The project entailed master planning for the network of airports and airfields in the North West Province. The environmental scope of work involved screening of each airport to determine the environmental opportunities and constraints regarding potential expansion at each of these airports or airfields. Responsible for conducting visual assessments of several airports, conducting a desktop study of the airports in the province, project presentation at the North-West University (NWU), setting up of airport layout drawings and airport site visit coordination.

Updating of the Mpumalanga freight databank, South Africa, North West, Mpumalanga Department of Public Works, Roads and Transport, 11/2016 - 03/2018, Graduate Civil Engineer

Zutari was appointed to update the freight databank for the Mpumalanga Province to be in line with the national freight databank. The project included collecting and consolidating multi-modal freight and infrastructure data from various agencies in Mpumalanga and creating an online, interactive database to assist in planning and strategy development. Zutari defined and identified national and provincial corridors, considering aspects such as level of usage, modes involved and function. Road freight data was largely obtained through surveys conducted at more than 50 stations throughout the province. Responsible for gathering relevant aviation information in the province.

Annexure B: Declaration of Independence

KWAZULU-NATAL PROVINCE
ECONOMIC DEVELOPMENT, TOURISM AND ENVIRONMENTAL AFFAIRS
REPUBLIC OF SOUTH AFRICA

	(For official use only)
Provincial Reference Number:	
NEAS Reference Number:	KZN / EIA /
Waste Management Licence Number (if applicable): Date Received by Department:	

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

Submitted in terms of section 24(2) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) or for a waste management licence in terms of section 20(b) of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008).

KINDLY NOTE:

1. This form is current as of **May 2021**. It is the responsibility of the Applicant / Environmental Assessment Practitioner ("EAP") to ascertain whether subsequent versions of the form have been released by the Department.

PROJECT TITLE

Cato Ridge Land Development and Release project

DISTRICT MUNICIPALITY

Ekurhuleni

1. SPECIALIST INFORMATION

Specialist name:	Zutari (Pty) Ltd		
Contact person:	(1) Yolandi Foord and (2) Wynand Schoeman		
Postal address:	River Walk Office Park, 41 Matroosberg Road, Ashlea Gardens Ext 6		
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Telephone:	(1) 012 427 2000	Fax:	N/A
E-mail:	(1) **yolandi.foord@zutari.com**; (2) **wynand.schoeman@zutari.com**		
Professional affiliation(s) (if any)	(1) ECSA (Pr.Eng) (2) ECSA (Pr.Eng)		
Project Consultant / EAP:	Zutari (Pty) Ltd		

Contact person:	Patrick Killick		
Postal address:			
Postal code:		Cell:	
Telephone:		Fax:	
E-mail:	patrick.killick@zutari.com		

2. DECLARATION BY THE SPECIALIST (1)

I, Yolandi Foord, declare that -

General declaration:

- I act as the independent specialist in this application;
- do not have and will not have any vested interest (either business, financial, personal or other) in the undertaking of the proposed activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I am aware that a person is guilty of an offence in terms of Regulation 48 (1) of the EIA Regulations, 2014, if that person provides incorrect or misleading information. A person who is convicted of an offence in terms of sub-regulation 48(1) (a)-(e) is liable to the penalties as contemplated in section 49B(1) of the National Environmental Management Act, 1998 (Act 107 of 1998).

Signature of the specialist:

Zutari (Pty) Ltd

Name of company:

12 October 2022

Date:

3. DECLARATION BY THE SPECIALIST (2)

I, Wynand Schoeman, declare that -

General declaration:

- I act as the independent specialist in this application;
- do not have and will not have any vested interest (either business, financial, personal or other) in the undertaking of the proposed activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I am aware that a person is guilty of an offence in terms of Regulation 48 (1) of the EIA Regulations, 2014, if that person provides incorrect or misleading information. A person who is convicted of an offence in terms of sub-regulation 48(1) (a)-(e) is liable to the penalties as contemplated in section 49B(1) of the National Environmental Management Act, 1998 (Act 107 of 1998).

Signature of the specialist:

Zutari (Pty) Ltd

Name of company:

12 October 2022

Date:

In diversity there is beauty and there is strength.

MAYA ANGELOU

Document prepared by:
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