BASIC ASSESSMENT ENVIRONMENTAL PROCESS FOR THE PROPOSED NEW WOLF-SKILPAD-GRASSRIDGE 132Kv TRANSMISSION LINE

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Title	Aviation Expertise Lead	Title	Environmental Assessment Practitioner

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1 Introduction

The intent of this report is to communicate the findings of a conceptual Obstacle Limitation Surface (OLS) assessment conducted to determine any foreseeable airspace impact posed by the new 132kV monopole transmission line route, proposed along Wolf-Skilpad-Grassridge substations, to the Uitenhage Aerodrome. The transmission line route will be located adjacent the regional route R75 between the towns of Wolwefontein and Kirkwood before crossing the R335 to the Grassridge Substation.

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

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

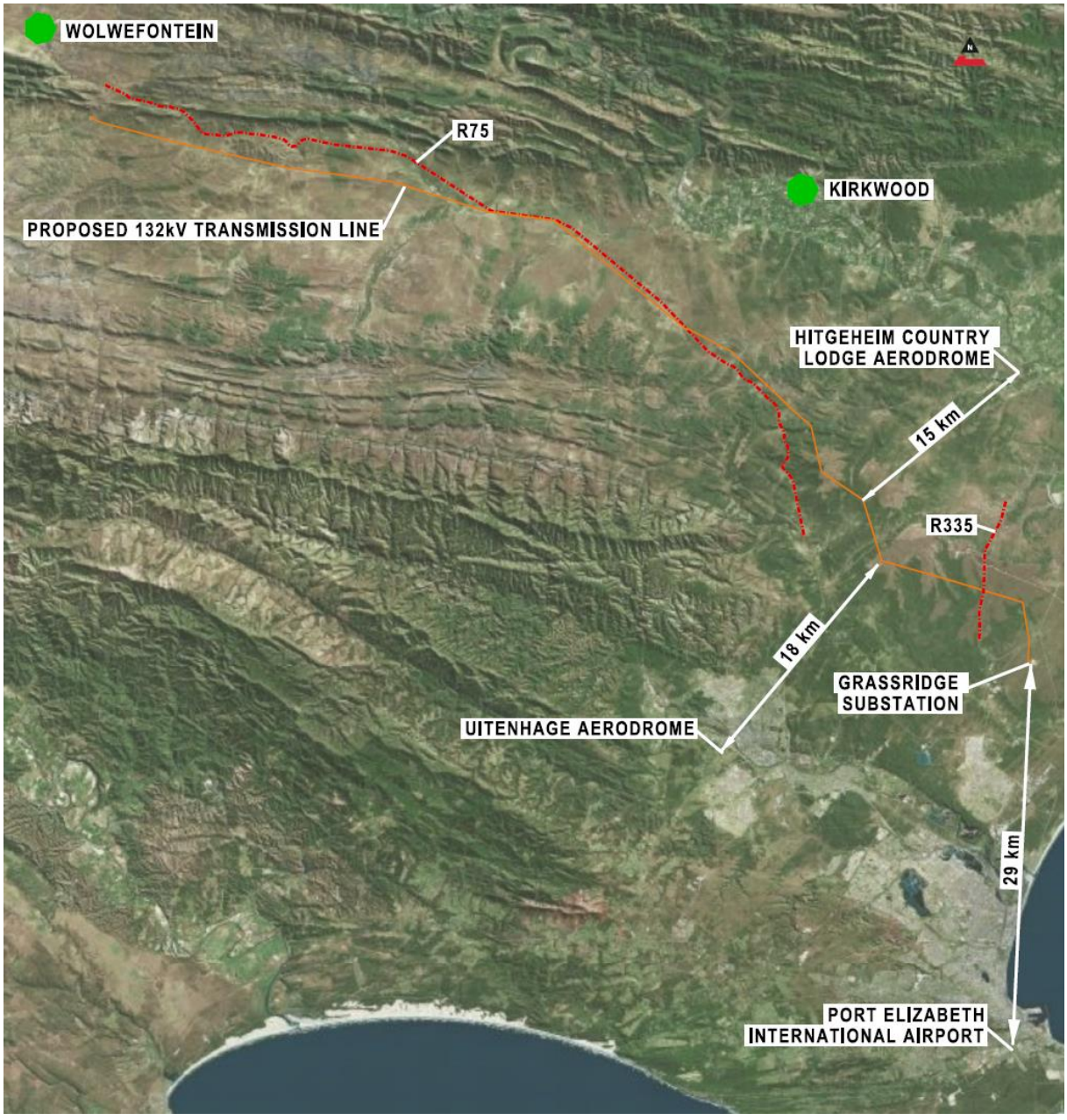


Figure 1: Locality map

2 Obstacle Limitation Surface Assessment

The OLS are series of surfaces that define the limits to which objects may project into airspace around aerodromes which are required to be maintained free from obstacles. Defining and assessing the OLS ensure that the intended aeroplane operations at the aerodromes are conducted safely and prevent the aerodromes from becoming unusable by the growth of obstacles around the aerodromes. Figure 2 illustrates the different OLS surfaces.

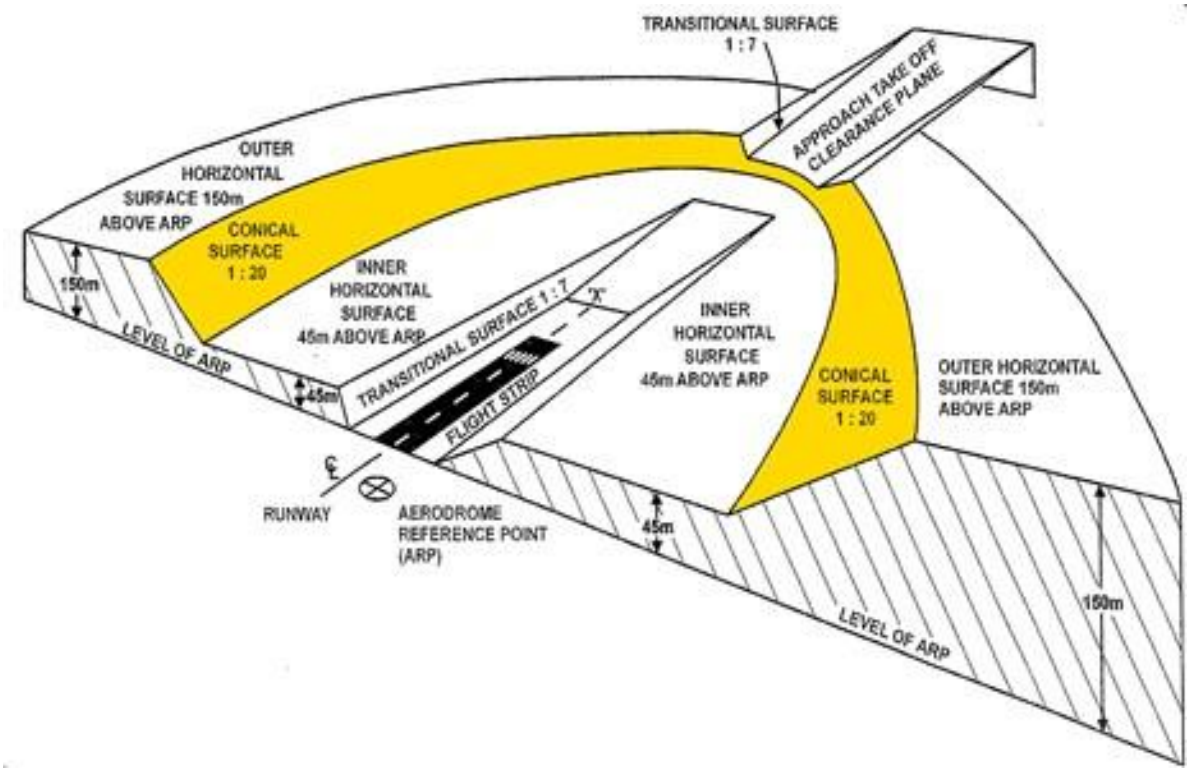


Figure 2: OLS illustration

2.1 OLS Assessment

Figure 3 illustrates the interaction with the OLS.

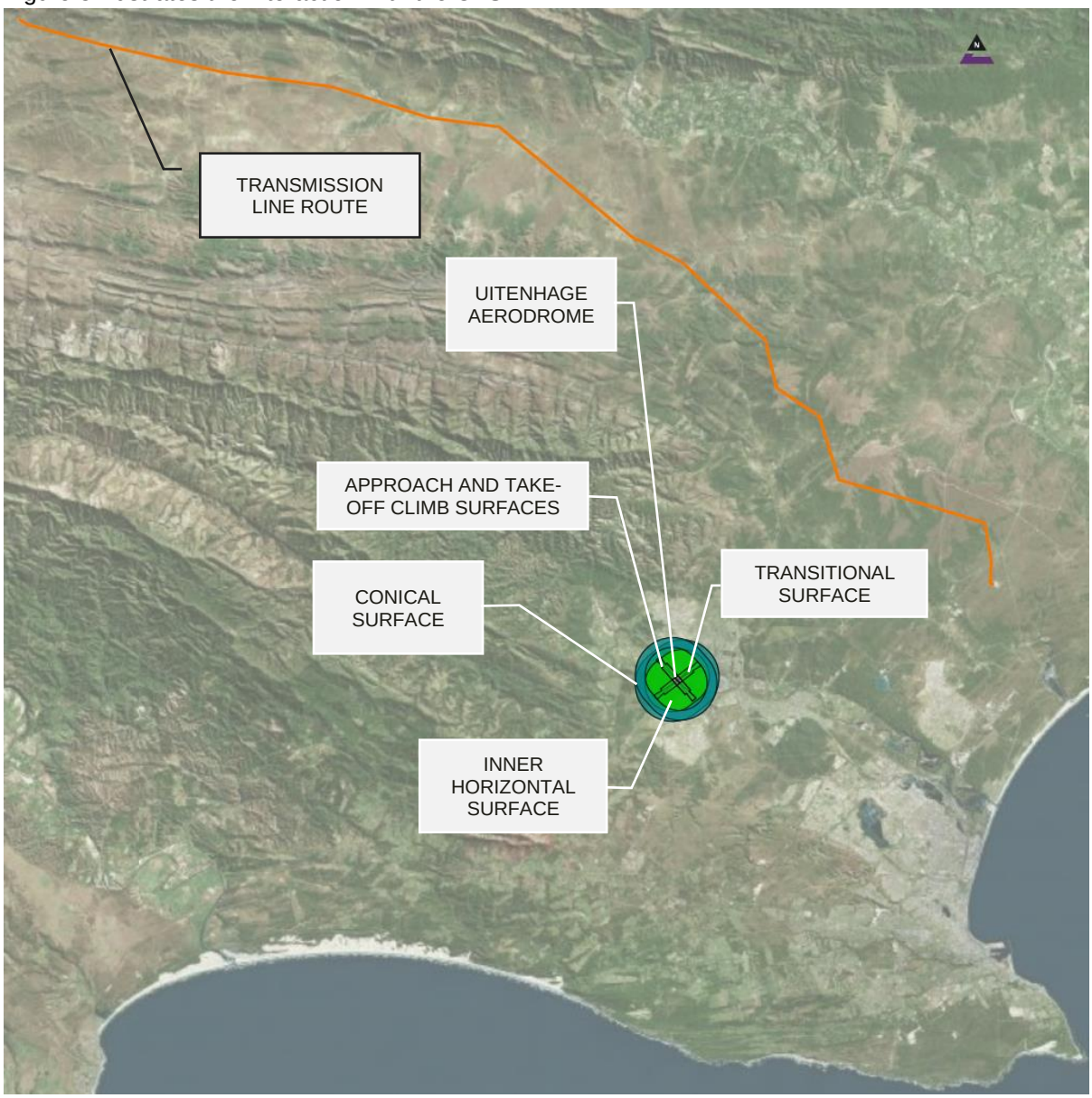


Figure 3: Uitenhage Aerodrome Obstacle Limitation Surfaces

2.1.1 Assumptions and considerations

The following assumptions and considerations were applied during the OLS assessment:

Table 1: Assessment assumptions and considerations

	Assumption/Consideration	Reference
Airstrip operational status	Operational	CAA Aerodrome Directory FAUH AD 2
Runway length	08/26 – 800 m 16/34 – 700 m	CAA Aerodrome Directory FAUH AD 2
Runway width	25 m	CAA Aerodrome Directory FAUH AD 2
Aerodrome reference code	1C	ICAO Annex 14
Aerodrome instrumentation category	Non-Instrument	Visual observation - Bing Maps
Aerodrome reference elevation	86.87 m	CAA Aerodrome Directory FAUH AD 2

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

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

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

2.1.2 Transitional Surfaces

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

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

As illustrated in Figure 3, the proposed transmission line is situated outside the Transitional Surfaces. Thus, no protrusions are anticipated in the Transitional Surfaces.

2.1.3 Approach and Take-off Climb Surfaces

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

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

Table 2: Approach and take-off surface parameters

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

As illustrated in Figure 3, the proposed transmission line is situated outside the Approach and Take-off Climb Surfaces. Thus, no protrusions are anticipated in the Approach and Take-off Climb Surfaces.

2.1.4 Inner Horizontal Surface

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

Figure 3 shows that the proposed transmission line is situated outside the Inner Horizontal Surface. Thus, no protrusions are anticipated in the Inner Horizontal Surface.

2.1.5 Conical Surface

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

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

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

2.2 Hitgeheim Country Lodge

The conditions of the aerodrome facility identified at Hitgeheim Country Lodge as illustrated in Figure 1 is unknown. The visual inspection of the facility warrants the assumption that the facility may not be operational. The non-operational status assumption of the facility, in addition to the distance of the facility to the transmission line, indicate that no airspace activities will be affected.

2.3 Conclusions and Recommendations

The undertaking of this high-level concept OLS assessment indicate that the proposed transmission line does not protrude the OLS of the Uitenhage Aerodrome.

3 Civil Aviation Compliance Assessment

3.1 Introduction

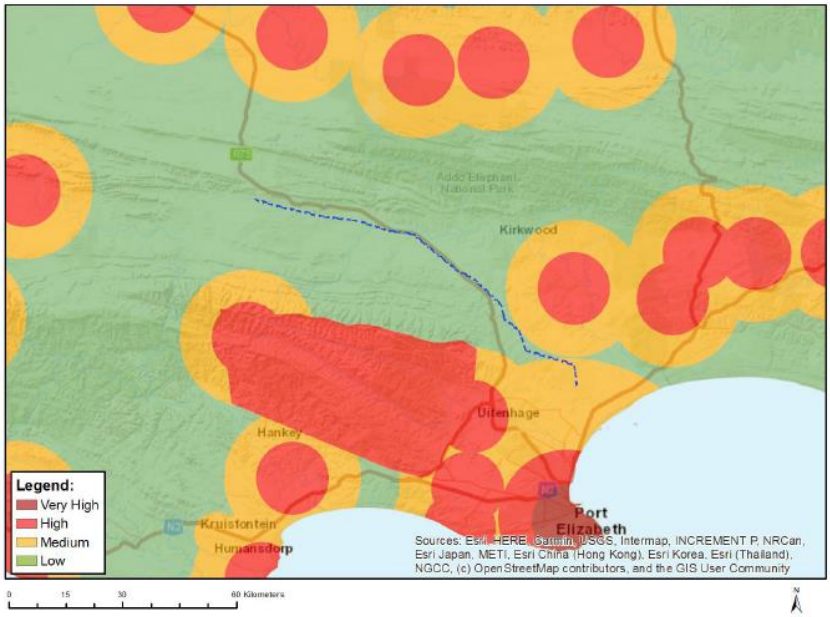
Government Notice No. 320 of 20 March 2020 stipulates the protocol for assessment and minimum report content for impacts on civil aviation installations, for activities that require environment authorisation. The reporting requirements are associated with the level of sensitivity as identified by the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

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

3.2 DFFE Screening Tool

Figure 4 illustrate the planned infrastructure footprint overlaid on the civil aviation sensitivity map as generated by the DFFE screening tool.

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity
Medium	Between 15 and 35 km from a civil aviation radar
Medium	Between 15 and 35 km from a major civil aviation aerodrome

Figure 4: Map of relative civil aviation theme sensitivity

Findings illustrated in Figure 4 indicate the low sensitivity feature of the planned infrastructure in relation to Uitenhage Aerodrome and medium sensitivity feature in relation to the Port Elizabeth International Airport. Our analysis shows agreement with low sensitivity with the Uitenhage Aerodrome.

The OLS assessment conducted however anticipates no interaction between the proposed transmission line and the OLS of Uitenhage Aerodrome. Furthermore, no OLS protrusions are anticipated at the Port Elizabeth International Airport due to the distance, ~29 km, being greater than 15km between the transmission line and the airport.

3.3 Conclusions and Recommendations

Although the planned infrastructure falls within the medium sensitivity rating, it is not foreseen that these civil aviation installations are impacted by the planned activities with consideration of the OLS of Uitenhage Aerodrome and the Port Elizabeth International Airport.

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

4 Qualifications and Expertise

This report was compiled and reviewed by the following professionals:

Roles	Names - Titles	Experience Summary	Qualification and Affiliations
Approver	Wynand Loftus - *Environmental Assessment Practitioner*	Wynand is an environmental scientist with more than seven years' experience in environmental science, including environmental management, environmental impact assessments (EIAs), and environmental regulatory compliance. He has been involved in a range of projects across South Africa, including EIAs for municipal civil infrastructure and housing, renewable energy developments and environmental auditing and compliance monitoring. Wynand specialises in: Impact Assessments; Environmental Management Programmes (EMPr); Environmental Control Officer (ECO) and Legislation	• MTech Nature Conservation • BTech Nature Conservation • NDip Nature Conservation • Aquaculture Certificate
Verifier	Wynand Schoeman – *Aviation Expertise Lead*	Wynand is an aviation specialist with 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 - *Associate*	Yolandi is a registered professional engineer specialising in airport planning and engineering design with experience in highway planning and engineering design. 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 Engineering management and technical design elements, concerned with the geometric design of highways, roads and airports, as well as civil services.	• Engineering Council of South Africa (ECSA) – Professional Engineer • Engineering Honours - 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 Civil Aviation Organization (ICAO) Standards and Recommended Practices (SARPs), national aviation regulations and technical standards.	• Engineering Council of South Africa (ECSA) – Candidate Engineer • Bachelor in Engineering - Civil

Annexure A: Curriculum Vitae

Wynand Loftus

Senior Consultant

Qualifications

Aquaculture Certificate

MTech Nature Conservation

BTech Nature Conservation

NDip Nature Conservation

Professional registrations

Registered professional Environmental Assessment Practitioner with EAPASA.

Professional Scientist, South African Council for Natural Scientific Professions (SACNSP)

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

Specialisation

Environmental management, impact assessments and regulations

8

years in industry

Wynand is an environmental scientist with more than seven years' experience in environmental science, including environmental management, environmental impact assessments (EIAs), and environmental regulatory compliance. He has been involved in a range of projects across South Africa, including EIAs for municipal civil infrastructure and housing, renewable energy developments and environmental auditing and compliance monitoring.

He is experienced in managing full EIA processes, including, amongst others, in compiling cost proposals for environmental advisory services; client interaction; budget management; conducting public participation processes (PPPs); compiling project reports such as EIA reports and environmental management programmes (EMPrs); and compiling of environmental maps in ArcView GIS.

Wynand is also an experienced environmental control officer (ECO), with expertise in, amongst others, auditing and monitoring environmental compliance on site, compiling environmental audit reports, and conducting environmental induction training with contractors.

He obtained a Master of Technology in Nature Conservation in 2013 and a Bachelor of Technology in 2011, both from the Nelson Mandela Metropolitan University (NMMU) in South Africa. He is registered as a professional scientist with the South African Council for Natural Scientific Professions (SACNASP) in is a member of the International Association for Impact Assessment South Africa (IAIAsa).

Experience

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

Zutari was appointed to assist with the material supply and planning, design and control aspects for the maintenance of gravel roads in the Central Karoo and Eden District Municipalities. Services include engineering geology, environmental studies, materials source identification and project management. Responsible for ECO work on gravel roads - environmental induction and training, monitoring compliance with the EMPr, providing environmental advisory services and ensuring that rehabilitation is done, and that mining takes places to ensure good rehabilitation can be achieved. Also assisting the DTPW with obtaining landowner approvals for temporary expropriation of land for gravel mining.

Strengthening of TR1/1 George-Oudshoorn, Western Cape Province, South Africa, Provincial Government of the Western Cape (PGWC): Department of Transport and Public Works (DTPW), 02/2018 - 12/2022, Senior Consultant

Zutari was appointed by the Department of Transport and Public Works: Roads Infrastructure Branch of the Western Cape Government (WCG) to undertake full engineering services of the strengthening of TR1/1 – George to Oudtshoorn. Zutari provided advice on the scope of work and also provided design input and deliverables to the client, as well as procurement and contract administration. Responsible for managing the environmental process in its entirety. This included compiling all reports, authority correspondence, public participation and financial management.

NamDeb wind monitoring campaign, Namibia, Namdeb Diamond, 03/2020 - 01/2022, Senior Consultant to Project Manager

Zutari was appointed to conduct a technical pre-feasibility study of a wind farm to provide electricity for NamDeb's diamond mines along the southern Namibian coastline. Responsible for compilation of environmental screening report and submission to the Namibian Ministry of Environment, Forestry and Tourism.

Nuweveld wind farms, Western Cape Province, South Africa, Red Cap Energy (Pty) Ltd (Red Cap), 03/2019 - 12/2021, Senior Consultant to Project Manager

Zutari has been appointed to facilitate three environmental impact assessments (EIAs) for the proposed Nuweveld wind farms, and to undertake one basic assessment (BA) process for an approximately 120 km gridline connection. Responsible for assisting the project manager with all delivery related tasks, including compiling reports, conducting site inspections, and managing spatial data.

Environmental advisory services to the Mossel Bay Local Municipality, Western Cape Province, South Africa, Mossel Bay Local Municipality, 01/2019 - 06/2021, Senior Consultant

Zutari was appointed on a municipal panel to provide environmental advisory services, including environmental impact assessments (EIAs), basic assessments (BAs) and environmental management programmes (EMPrs). Responsible for compiling and submitting an environmental applicability checklist to the local environmental, competent authority. Also responsible for facilitating the BA and EIA processes.

Materials supply for gravel roads, Western Cape Province, South Africa, Provincial Government of the Western Cape (PGWC): Department of Transport and Public Works (DTPW), 02/2015 - 02/2020, Senior Consultant/Environmental Control Officer (ECO)

Zutari has been appointed to assist with the material supply and planning, design and control aspects for the maintenance of gravel roads in the Central Karoo and Eden District Municipalities. Services include engineering geology, environmental studies, materials source identification and project management. The contract primarily entails locating and proving suitable material sources for the re-gravelling of 300 km and maintenance activities of 45 000 km of all gravel roads in the two identified district municipalities. Obtaining approval for the use of material sources was a challenge due to the associated environmental and legal aspects, where legal approval was required from the Department of Mineral Resources (DMR) and from the Department of Environmental Affairs and Development Planning (DEADP). Responsible for carrying out basic assessment (BA) processes to apply for environmental authorisation and mining permits from the DMR. The BA included all relevant authority correspondence and public participation processes (PPPs). Also responsible for carrying out environmental control officer (ECO) duties at various borrow pits throughout the Garden Route and Central Karoo District Municipalities, including site inspections, compiling monthly ECO reports, monitoring mining activities, and corresponding with the two district municipalities.

Environmental advisory services to George Local Municipality, Western Cape Province, South Africa, George Local Municipality, 02/2019 - 02/2021, Senior Consultant

Zutari was appointed to carry out the basic assessment (BA) environmental process for remedial works along Rooidraai Road in Herolds Bay. Responsible for compiling basic assessment reports (BARs), the public participation process (PPP), and the application form. Duties include corresponding with and managing environmental specialists and liaising with environmental competent authority.

Materials supply for gravel roads, Western Cape Province, South Africa, Provincial Government of the Western Cape (PGWC): Department of Transport and Public Works (DTPW), 02/2015 - 02/2020, Senior Consultant/Environmental Control Officer (ECO)

Zutari has been appointed to assist with the material supply and planning, design and control aspects for the maintenance of gravel roads in the Central Karoo and Eden District Municipalities. Services include engineering geology, environmental studies, materials source identification and project management. The contract primarily entails locating and proving suitable material sources for the re-gravelling of 300 km and maintenance activities of 45 000 km of all gravel roads in the two identified district municipalities. Obtaining approval for the use of material sources was a challenge due to the associated environmental and legal aspects, where legal approval was required from the Department of Mineral Resources (DMR) and from the Department of Environmental Affairs and Development Planning (DEADP). Responsible for carrying out basic assessment (BA) processes to apply for environmental authorisation and mining permits from the DMR. The BA included all relevant authority correspondence and public participation processes (PPPs). Also responsible for carrying out environmental control officer (ECO) duties at various borrow pits throughout the Garden Route and Central Karoo District Municipalities, including site inspections, compiling monthly ECO reports, monitoring mining activities, and corresponding with the two district municipalities.

Mossel Bay Upgrading of Informal Settlements Programme (UISP), Western Cape Province, South Africa, Mossel Bay Local Municipality, 01/2017 - 12/2019, Senior Consultant

Zutari was appointed to provide project management services for informal settlement upgrading in the Mossel Bay Local Municipality via the UISP, as a follow on to the National Upgrading Support Programme (NUSP). Zutari's scope of works included the project planning, procurement of requisite planning and environmental permissions and implementation oversite for 22 informal settlements. Responsible for coordinating environmental processes and project management, including four Section 24G processes and one amendment application, facilitating specialist inputs and assessments, and corresponding and interacting with relevant organs of state and authorities.

Basic assessment (BA) for the Koeris Wind Energy Facility (WEF) temporary fuel storage facility, Northern Cape Province, South Africa, Mainstream Renewable Power, 10/2018 - 10/2019, Senior Consultant

Zutari was appointed to facilitate the requisite basic assessment (BA) environmental process for the construction of a temporary fuel storage facility for the construction period of the Koeries Wind Energy Facility (WEF) in Springbok. Responsible for carrying out the full BA process, including compiling a basic assessment report (BAR) and environmental management programme (EMPr), conducting a full public participation process (PPP) and carrying out all project management related duties.

Environmental planning and compliance for the Working for Wetlands Programme 2017-2019, National, South Africa, Department of Environmental Affairs (DEA), 11/2016 - 06/2019, Senior Consultant

Zutari, in association with GroundTruth, was appointed to undertake the planning and approval processes for the Working for Wetlands Programme for the period 2017-2019. The programme has been mandated to rehabilitate damaged wetlands and to protect pristine wetlands. The methodology followed constitutes three phases. The coarse-scale planning (Phase 1) entails the identification of degraded wetlands for rehabilitation purposes; the detailed planning (Phase 2) is for the identification and design of rehabilitation interventions and obtaining environmental authorisations in terms of the National Environmental Management Act no 107 of 1998 (NEMA) and Phase 3, the provision of

implementation support, includes setting out and signing off constructed interventions and monitoring and evaluating wetland rehabilitation projects. Responsible for the compilation of basic assessment reports (BARs), the public participation process (PPP) and application form as well as conducting site inspections.

Environmental audit for the Garden Route Casino, Western Cape Province, South Africa, Garden Route Casino, 07/2018 - 06/2019, Senior Consultant

The project involved providing environmental advisory services and the complete requisite environmental audit for the Garden Route Casino and determining the best way forward for the casino to comply with its responsibilities. Responsible for correspondence with the local environmental competent authority regarding the regulatory environmental audit requirements applicable to the Garden Route Casino. Also responsible for carrying out the environmental audit, compiling an audit report and submitting the report to the competent authority.

Environmental impact assessment (EIA) for the extension of ashing facilities at Kriel Power Station, Mpumalanga Province, South Africa, Eskom, 08/2016 - 11/2017, Senior Consultant

Zutari was appointed to undertake an environmental impact assessment (EIA) for the extension of an ash dam facility at the Kriel Power Station. The EIA was postponed after the scoping phase was completed in 2011 due to further geotechnical investigation being required for the preferred site. In 2016, Zutari's appointment was amended to allow for a new EIA process to be undertaken in terms of the latest environmental legislation. Responsible for comparing 2014 National Environmental Management Act (NEMA) EIA regulations with the amended 2017 NEMA EIA Regulations and listing similarly listed activities.

Environmental impact assessment (EIA) for the Hotazel Solar Park, Northern Cape Province, South Africa, juwi Renewable Energies (Pty) Ltd, 05/2016 - 10/2017, Senior Consultant

The project comprised entailed an environmental impact assessment (EIA) for the development of a 200 MW solar photovoltaic (PV) facility, including a utility scale battery storage facility, as well as transmission line. Zutari's services included environmental management and advisory, transport assessments, hydrological assessments and stormwater planning. Responsible for assisting the project leader with public participation process (PPP).

Ladismith West flood damage repair, Western Cape Province, South Africa, Hatch Goba, 01/2016 - 03/2017, Environmental Control Officer (ECO)

The project entailed providing environmental control officer (ECO) services for the construction and repair of stream crossings along a provincial road. Work was carried out within watercourses and sound environmental management was particularly important. Responsible for conducting site inspections and compiling the ECO reports to ensure compliance with the environmental maintenance management plan (MMP). Also responsible for conducting environmental induction training with the contractor and his staff, informing them of the environmental sensitivity of the site, identifying no-go areas, and educating staff on the importance of practising sound environmental management.

Saffraan Rivier maintenance management plan (MMP), Western Cape Province, South Africa, Private client, 2015 - 03/2017, Consultant/Environmental Control Officer (ECO)

The appointment involved providing environmental advisory services to a private landowner in Oudtshoorn, including correspondence with the competent authority and the compilation of a road management plan and an environmental maintenance management plan (MMP) for the property. Responsible for compiling a road rehabilitation plan and MMP for the farm and acting as environmental control officer (ECO) on the river rehabilitation and alien clearing activities.

Midbrak sewer upgrades and pump station (Great Brak River), Western Cape Province, South Africa, V3 Consulting Engineers, 2016 - 03/2017, Environmental Control Officer (ECO)

The project involved providing environmental control officer (ECO) services for the construction of a main sewer line and pump station. Responsible for conducting site inspections and compiling ECO

reports, the post-construction audit report, and post-rehabilitation audit reports. The rehabilitation comprised the re-planting a variety of coastal forest species along the pipeline alignment and watering the plants every fortnight. Also responsible for conducting environmental induction training with the contractor and his staff, informing them of the environmental sensitivity of the site, identifying no-go areas and educating staff on the importance of practising sound environmental management.

Herold Meander mixed-use development, Western Cape Province, South Africa, Sonqua Consulting, 01/2016 - 03/2017, Consultant

The project involved a mixed-used development (i.e. agricultural village) comprising various agricultural components, including amongst others hops farming, small scale product processing, flower farming, honey farming, an aquaculture facility, and grazing for livestock). The housing component and infrastructure included package plant wastewater treatment works (WWTWs), a reservoir and pipelines. The development also has various tourism activities and a community hall. Responsible for carrying out the scoping and environmental impact assessment (EIA) processes, which included compiling environmental reports, and public participation and project management duties such as specialist management and consultation with authorities.

Erf 325 East Municipal Housing Project Amendment Application, Western Cape Province, South Africa, George Local Municipality, 2014 – 2017, Consultant

The project entailed the compilation of an Impact Statement Report in support of an application to amend the existing environmental authorisation and assist the project manager with public participation related tasks e.g. placing adverts and compiling and distributing notifications.

Pre-Feasibility Environmental Constraints Analysis for George Municipality Housing Infill, Western Cape Province, South Africa, George Local Municipality, 2014 – 2017, Consultant

The project involved the investigation of various proposed infill housing sites throughout George. It included the compilation of a pre-feasibility constraints report which included presenting the sites spatially with all the relevant (and available) desktop based environmental GIS information and determining whether further environmental investigations in terms of NEMA would be required. A recommendation relating to the required environmental approvals was also made.

Beaufort West 22 kV power lines, Western Cape Province, South Africa, Eskom, 2015 - 2016, Environmental Control Officer (ECO)

The project involved providing environmental control officer (ECO) services for the construction of six 22 kV powerlines through undeveloped land in Beaufort West. Responsible for ECO services.

Basic assessment (BA) process for the Bitou Public Safety Centre, Western Cape Province, South Africa, SMEC, 2015 - 2016, Consultant

The project involved a full basic assessment (BA) process for the Bitou Public Safety Centre in Plettenberg Bay. Responsible for compiling reports, including the basic assessment report (BAR) and environmental management plan (EMP); conducting a full public participation process (PPP); and all project management related duties.

Brandwacht Mediclinic amendment application, Western Cape Province, South Africa, Atterbury Property Developments, 2015 - 2016, Consultant

The project involved a Part 2 amendment application process, which included compiling an impact statement report and public participation, for the Brandwacht Mediclinic in Stellenbosch. The original decision was appealed and therefore an amendment application was submitted via the Western Cape Minister of Environmental Affairs' Office. Responsible for coordinating the amendment application process.

Uitvlug Section 24G application, Western Cape Province, South Africa, Private client, 2014 - 2016, Consultant

The project involved carrying out a full environmental Section 24G process for the illegal construction of a road and vegetation clearance in Oudtshoorn. Responsible for carrying the Section 24G rectification process.

Henque waste management licence (WML), Western Cape Province, South Africa, Henque Waste, 2015, Consultant

Responsible for carrying out a full waste management licence (WML) application for a waste management and sorting facility.

Sonskynvallei Phase 3 municipal housing project, Western Cape Province, South Africa, Mossel Bay Local Municipality, 2014 - 2015, Consultant

The project entailed providing environmental advisory services and carrying out a full basic assessment (BA) environmental process for the municipal housing development in Sonskynsvallei. Infrastructure upgrades associated with the project included increasing the capacity of an existing water reservoir, and constructing a new bulk water pipeline and sewer rising main. Specialist assessments included archaeological, botanical, heritage, traffic and visual assessments. Responsible for carrying out a full BA process, including the compilation of environmental reports such as a basic assessment report (BAR) and environmental management programme (EMPr); conducting a full public participation process (PPP) and all project management related duties, including specialist management and consultation with authorities.

Metrogrounds Municipal Housing Project, Western Cape Province, South Africa, George Local Municipality, 2014, Consultant

The project entailed providing environmental advisory services and carrying out a full basic assessment (BA) environmental process for the municipal housing development in Golden Valley, Blanco, George. The project proposal included the establishment of serviced erven, streets and top structures. Responsible for carrying out a full BA process, including the compilation of environmental reports such as a basic assessment report (BAR) and environmental management programme (EMPr); conducting a full public participation process (PPP) and all project management related duties, including specialist management and consultation with authorities.

Thembalethu N2 Municipal Housing Project, Western Cape Province, South Africa, George Local Municipality, 2014, Consultant

The project entailed providing environmental advisory services and carrying out a full basic assessment (BA) environmental process for the municipal housing development in Golden Valley, Blanco, George. The project proposal included the establishment of serviced erven, streets and top structures. Responsible for carrying out a full BA process, including the compilation of environmental reports such as a basic assessment report (BAR) and environmental management programme (EMPr); conducting a full public participation process (PPP).

Conville Municipal Housing Project, Western Cape Province, South Africa, George Local Municipality, 2014, Consultant

The project entailed providing environmental advisory services and carrying out a full basic assessment (BA) environmental process for the municipal housing development comprising of Community Residential Units (CRU, 2 storey walk-ups) in Conville, George. Responsible for carrying out a full BA process, including the compilation of environmental reports such as a basic assessment report (BAR) and environmental management programme (EMPr). Also responsible for a full public participation process (PPP) and all project management related duties, including specialist management and consultation with authorities.

Golden Valley Municipal Housing Project, Western Cape Province, South Africa, George Local Municipality, 2014, Consultant

The project entailed providing environmental advisory services and carrying out a full basic assessment (BA) environmental process for the municipal housing development in Golden Valley, Blanco, George. The project proposal included the establishment of serviced erven, streets and top structures. Responsible for carrying out a full BA process, including the compilation of environmental reports such as a basic assessment report (BAR) and environmental management programme (EMPr). Also responsible for a full public participation process (PPP) and all project management related duties, including specialist management and consultation with authorities.

Wynand Schoeman

Engineer

Qualifications

BEng Civil Engineering

BEng (Hons) Technology Management

Professional registrations

Professional Engineer, Engineering Council of South Africa (ECSA)

Specialisation

Airport and municipal infrastructure

20

years in industry

Wynand is a professional engineer in Aurecon'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).

Experience

Panel for built environment consultants for the Airports Company South Africa (ACSA), Gauteng Province, South Africa, 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), Eastern Province, 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), Gauteng Province, South Africa, 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, Gauteng Province, South Africa, 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, Ogun State, Nigeria, 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, Lunda Norte Province, Angola, 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), KwaZulu-Natal Province, South Africa, 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, Tete Province, Mozambique, 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, Port Louis District, 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, Cunene Province, Angola, 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, Oshana Region, Namibia, 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, Luanda Province, Angola, 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, Maseru District, 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, Central District, Botswana, 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, North West Province, South Africa, 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.

Ad hoc engineering services for various Exxaro projects, Limpopo Province, South Africa, 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.

Upgrading of the South African Police Service's (SAPS's) K9 Academy at Roodeplaat, Gauteng Province, South Africa, 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.

New Quattro 4th Eskom intake and related works, Gauteng Province, South Africa, 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, Port Harcourt, Nigeria, 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.

Master plan for a leisure resort in Elephant Bay, Benguela Province, Angola, 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.

Design of water supply infrastructure for Necuto, Cabinda Province, Angola, 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.

Design and analysis for the Middelburg Water Reclamation Project (MWRP), Mpumalanga Province, South Africa, 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.

Featherwood Residential Estate, Gauteng Province, South Africa, 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, Luanda Province, Angola, 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), Gauteng Province, South Africa, 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, Manzini District, 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, Namibe Province, Angola, 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, Limpopo Province, South Africa, 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.

Expansion of Liqhobong Diamond Mine, Liqhobong Valley, 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.

Alterations to the airside aprons and taxiways at OR Tambo International Airport (ORTIA), Gauteng Province, South Africa, 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.

Infrastructure engineering services for the Euphoria Golf Estate and Hydro development, Limpopo Province, South Africa, 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, Northern 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, Gauteng Province, South Africa, 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, Gauteng Province, South Africa, 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.

Design, project management and site supervision of the Aparthotel Baía, Luanda Province, Angola, 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, Luanda Province, Angola, 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, Gauteng P{FB}rovince, South Africa, 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, Luanda Province, Angola, 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), Mpumalanga Province, South Africa, 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.

Structural design and pump specifications for the Itsoseng bulk water supply project, North West Province, South Africa, 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.

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, Cabinda Province, Angola, 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, Mpumalanga Province, South Africa, 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, Tete Province, Mozambique, 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.

Construction of the Sunrise View Retirement Estate, Gauteng Province, South Africa, 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.

Design, project management and site supervision for the Edifício Maianga, Luanda Province, Angola, 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.

Façade engineering services for the Torres Atlantico building, Luanda Province, Angola, 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, Southern and South-Eastern Districts, Botswana, 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, Luanda Province, Angola, 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, Gauteng Province, South Africa, 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, Gauteng Province, South Africa, 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, Southern Province, 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, Gauteng Province, South Africa, 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 m³ of earth material.

Cut-off trench at OR Tambo International Airport (ORTIA), Gauteng Province, South Africa, 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.

Upgrade of airside at Lanseria International Airport, Gauteng Province, South Africa, Lanseria International Airport, 2003, 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.

Apron area, mass earthworks and appurtenant works for new Execujet facility, Gauteng Province, South Africa, Execujet South Africa, 2001 - 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.

Steel fuel line at Johannesburg International Airport (JIA), Gauteng Province, South Africa, Airports Company South Africa (ACSA), 2002, 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.

Design of various roads in Lesotho, Lesotho, Government of the Kingdom of Lesotho (GOL), 2001, 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.

Eastern Cape road centreline survey, Eastern Cape Province, South Africa, Eastern Cape Provincial Administration (ECPA), 2000, 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.

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

Western Cape visual calibration sections, Western Cape Province, South Africa, Provincial Administration of the Western Cape (PAWC), 1999 - 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.

Yolandi Foord

Engineer

Qualifications

BEng Civil

BEng (Hons) Transportation

Professional registrations

Professional Engineer, Engineering Council of South Africa (ECSA)

Member, South African Institution of Civil Engineering (SAICE)

Specialisation

Airports and highway engineering

14

years in industry

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.

Experience

New Bugesera International Airport (NBIA) WS1, Rwanda, 01/2020 - 07/2022, Qatar Airways Group Q.C.S.C, 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, Gauteng Province, South Africa, 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, Ogun State, Nigeria, 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), Gauteng Province, South Africa, 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).

Design for the construction of new runway at Calueque Airport, Phase 1, Cunene Province, Angola, 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.

Geometric reconfiguration of OR Tambo International Airport (ORTIA) cargo terminal access roads and unit load device (ULD) area, Gauteng Province, South Africa, 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.

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

Zutari 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, KwaZulu-Natal Province, South Africa, 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, North West Province, South Africa, 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, Maseru District, 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), Gauteng Province, South Africa, 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, Príncipe and São Tomé, 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), Gauteng Province, South Africa, 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, Tete Province, Mozambique, 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, Maseru District, 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), North West Province, South Africa, 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 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, North West Province, South Africa, 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 alternative

Tony Kandolo

Civil Engineer

Qualifications

BEng Civil

Professional registrations

Member, Golden Key International Honour Society (GKIHS)

Candidate Engineer, Engineering Council of South Africa (ECSA)

Associate Member, South African Institution of Civil Engineering (SAICE)

Specialisation

Civil engineering

5

years in industry

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.

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, Eastern Cape Province, South Africa, 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, Taraba State, Nigeria, 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, Gauteng Province, South Africa, 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), Gauteng Province, South Africa, 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.

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

The project entailed the development 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.

Design review and construction supervision for the New Bugesera International Airport (NBIA), Eastern Province, 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.

Rehabilitation of the runway of the airfield serving Sunrise Dam Gold Mine, Western Australia (WA), Australia, 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.

Reconnaissance and pre-feasibility study for pre-identified hydropower sites in the Lubudi Region, Democratic Republic of the Congo (DRC), 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.

Perth Airport master plan, Western Australia (WA), Australia, 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.

Aeronautical study for the Abeokuta International Airport, Ogun State, Nigeria, 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), KwaZulu-Natal Province, South Africa, 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, North West Province, South Africa, 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, North West Province, South Africa, 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

In diversity there is beauty and there is strength.

MAYA ANGELOU

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