CIVIL AVIATION SENSITIVITY STUDY IN SUPPORT OF AN ENVIRONMENTAL IMPACT ASSESSMENT FOR A PROPOSED GAS TO POWER PLANT ON PORTIONS OF FARM 389, MALELANE, MPUMALANGA PROVINCE

PREPARED FOR:

NSOVO ENVIRONMENTAL CONSULTING, ON BEHALF OF KHANYAZWE FLEXPOWER (PTY) LIMITED

PREPARED BY

DRAFT

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1 Executive Summary

Institutional Background

In March 2020, the National Department of Forestry, Fisheries and the Environment (DFFE) gazetted a Protocol that requires Environmental Assessment Practitioners (EAPs) to assess the environmental impact of proposed developments on nearby civil aviation facilities. Institutionally, the South African Civil Aviation Authority (SACAA) is concerned with civil aviation safety and security, and the DFFE is mandated to ensure that the environmental impact of developments on civil aviation infrastructure is within reasonable parameters. To this end the Protocol specifies distance limits that trigger specialist studies by civil aviation specialists. To assist EAPs, it developed a screening tool (Screening Tool) to allow them to undertake a preliminary assessment of the sensitivity of proposed developments. If the results of this assessment indicate medium or higher sensitivity, then a specialist Civil Aviation Sensitivity Study (CASS) is necessary to verify or revise the assigned sensitivity level. Should the CASS conclude that the sensitivity of the proposed site is indeed medium or higher, a Civil Aviation Compliance Statement is then required. Since December 2023, practice at the SACAA (as an I&AP) is to also require submission of an Obstacle Approval Application in terms of Part 139 of the Civil Aviation Regulations, using the CA 139-27 process.

Nsovo Environmental Consulting (Nsovo), on behalf of Khanyazwe Flexpower (Pty) Limited (Khanyazwe), are undertaking an Environmental Impact Assessment and Environmental Management Programme Report ('EIA/EMPr') for a proposed gas to electricity plant on portions of the farm Malelane 389, near Malelane, Mpumalanga. Four alternative sites are under consideration, all of which are within 8km of the Malelane Aerodrome (FAMN), which triggers a CASS in terms of the Protocol.

A Screening Tool analysis by Nsovo indicated a high sensitivity on account of the proximity of the site to FAMN. This triggers a CASS, for which GWI Aviation Advisory (GWI) were appointed by Nsovo.

The scope of GWI's appointment is initially to undertake a CASS, including recommendations as to which of the alternative sites would be preferred from an aviation perspective. Once the site selection has been finalised, the scope includes the preparation and facilitation of the Obstacle Approval Application to the SACAA.

Should the study confirm that the sensitivity is medium or higher, it may be necessary to further extend the scope to include a full Aeronautical Study, if requested by the CAA, and procure a Civil Aviation Compliance Statement. Elements of this study are however included in this report in accordance with good practice.

SA Civil Aviation Authority Regulations and Technical Standards (CARS and CATS) often require extended Aeronautical Studies for developments deemed by the CAA to present high safety and/or operational risk to nearby aerodromes. CATS 139.01.30, which has recently been amended (SA-CATS2 of 2023 and Amendment 26 of the Civil Aviation Regulations) in fact impose on aerodrome licence holders (as I&AP's) the obligation to mitigate certain risks that obstacles or other issues may present to aerodrome or aircraft operations. In the current case, the high sensitivity indicated by the Screening Tool relates to the proximity to FAMN, which is a CAA licensed aerodrome at Aerodrome Category 2. While it is unlikely that a full Aeronautical Study will be required at this stage, this CASS will address certain overlapping issues to ensure a robust approach to both potential environmental and safety concerns that might be identified.

Scope and Methodology

The CASS conducted by GWI was in terms of the DFFE Protocol, but also included various analyses to SACAA standards, based on methodologies as outlined in SACAA document "Technical Guidance Material for conducting Aeronautical Studies or Risk Assessment', effective January 2022 (Appendix 6.3). This includes the following elements:

- Initiation – Identification of potential impacts and risk issues
- Technical analysis
- Compliance assessment
- Risk Assessment – Estimation, Evaluation and Control
- Action and Monitoring, including Risk Mitigation (as required).

Thus, in addition to the DFFE Protocol 320 of March 2020, the study references various standards and recommended practices (SARPS) of the International Civil Aviation Organisation (ICAO), the SA Civil Aviation Authority (SACAA) and the Air Traffic and Navigational Services SOC Limited (ATNS), details of which are included in Section 2.

In summary, the current study arises because the proposed development is within the trigger distances of the aerodrome mentioned (FAMN), for which the Screening Tool has indicated 'high' sensitivity. This relates mainly to potential risks associated with obstacle limitation surfaces and potential interference with communications and navigational equipment and infrastructure.

Summary of Findings

Aeronautical Standards

The main findings of the study are as follows:

- The closest alternative site (Option 3) is 1,88km from Malelane Aerodrome (FAMN) at its closest point, but this is the least favoured Option.

- Only Option 1 and the associated ground-based infrastructure is fully compliant with relevant ICAO Annex 14 and SACAA (CARS and CATS) standards for obstacle limitation surfaces and can therefore be supported without further analysis.

- Options 2 and 4 have pre-existing topographical obstacles between the proposed sites and the FAMN airport. Since these obstacles are higher than the height of the proposed structures and therefore provide a 'screening' effect, Options 2 and 4 can also be supported as alternative sites.

- The proposed development will not materially impact civil aviation radar, navigational or communications infrastructure in the environs, nor present any material additional risks to operations at the affected aerodrome or within adjacent airspace for Options 1, 2 and 4.

- Of the alternative sites considered, Options 1,2 and 4 are preferred from an aviation perspective, with Option 3 presenting significantly higher risk.

Environmental

The findings of the CASS are that sensitivity is low for all site options, and that therefore no Civil Aviation Compliance Statement will be required for the purposes of environmental authorisation.

Individual Aspects

- **Radar Installations & Navigational Infrastructure**:

  There is no evidence of ground-based civil radar installations closer than 15km from the site. This is well outside the guideline recommended by the US FAA (500ft, per Appendix 6.9) within which potential RF interference could occur. Risk of interference has been assessed as low.

  There are no ground-based DVOR/DME (see Appendix 6.1 Glossary of Terms) installations within 8-15km of the development site and risk is assessed as low.

  There are no ground-based NDB (see Appendix 6.1 Glossary of Terms) installations within 8-15km of the development site and risk is assessed as low.

- **Aerodromes and Obstacle Limitation Surfaces**

  Malelane (FAMN) is a minor licensed aerodrome at ICAO Code 2B. The aerodrome is located 1,88km from the proposed development at its nearest point (Figures 3 & 4). There is another aerodrome relatively close to the

site, being a farm aerodrome registered with the CAA as R 326 (mistakenly identified as 'Malelane Aerodrome' in Figure 3, sourced from Google Earth), but this aerodrome is further from the subject site than FAMN.

The risk to airport operations has been assessed as low and the ICAO obstacle limitation surfaces of the aerodrome are not impacted.

- **Approach and Take-off/Climb surfaces**

  All development site options fall outside the approach and take-off/climb surfaces (2 500m for ICAO Code 2 aerodromes) of FAMN. The development is therefore expected to contribute no additional risk to safe operations to and from the aerodrome.

- **Inner Horizontal Surface (IHS)**

  Development site options 1,2 and 4 fall outside the IHS footprint of FAMN (a 2,5km radius per ICAO Annex 14 for an ICAO Aerodrome Reference Code (ARC) 2B aerodrome), while Option 3 falls inside the ICAO IHS. However, all Options fall within the 8km zone imposed by the SACAA within which objects are limited to a height of 45m above the relevant runway level. The maximum height of proposed structures is 30m. However, when the elevation of the FAMN airport and that of the various options are assessed together, only Option 1 is fully compliant with the provisions of the ICAO SARP's and the CAA 45m limitation. Whiles Options 2 and 4 are not fully compliant, they are mitigated by the existence of terrain between the sites and the FAMN airport, which is higher than the height of the proposed structures and therefore screens these sites.

  SACAA standards will however require the developer to comply with Obstacle Approval procedures per CA139-27, for all potential obstacles within 8km of FAMN. Option 3 will almost certainly require an extension of the scope to include a full Aeronautical Study and a Civil Aviation Compliance Statement.

- **Conical Surface (CS)**

  The CS of FAMN extends 1 200m beyond the inner horizontal surface (i.e. 3,6 km in total), to a total height of 105m above runway level, and therefore influences part of the subject site. However, the SACAA limit of 45m within 8km is more critical per CARS Part 139.01.30.

- **Transitional Surface**

  The Transitional Surface for FAMN commences 40m from the runway centreline, at the edge of the (Code 2) runway strip, and slopes upwards at a grade of 20%, at right angles to the runway. This surface governs the height limit for any non-friable objects to a height of 45m above the runway level, beyond which the IHS governs. This occurs 265m from the runway centreline at FAMN. The closest site option, being Option 3 is 1,88km away, but located in any event just outside the potential influence of the transitional surface, which generally impacts developments adjacent to the runway. At this point the CAA object height limit of 45m will govern, but risk is high due to the proposed development effectively penetrating this surface by 36m (see 4.1.2 for details).

- **Existing Obstacles**

  There are no significant obstacles between FAMN and the proposed development, other than natural terrain, resulting in low risk of any impact of the proposed development on operations at FAMN.

- **Civil Aviation Routes**: **Radio and Communications Interference**

  The proposed development does not affect any conventional or satellite-based (GNSS and RNAV – see Glossary in Appendix 6.1) route under air traffic control (ATC) of ATNS centres at OR Tambo International Airport (FAOR) (Figure 4).

  The guideline minimum distances prescribed by the FAA for the siting of facilities away from radar, navigational and other communications devices they could potentially impact, range from 250ft to 500ft (Appendix 6.9), which are well below the distance of the proposed development from any ground-based

communications infrastructure and radio equipment, the closest of which is beyond 15km, or overflying aircraft. Risk of such interference is thus low.

2 Introduction

Khanyazwe Flexpower intends to develop a gas to electricity plant on one of four alternative site options located on the farm Malelane 389, Mpumalanga.

The proposed development requires Environmental Authorisation in terms of the National Environmental Management Act (Act 107 of 1998), and Nsovo is the independent Environmental Assessment Practitioner (EAP) appointed to conduct an Environmental Impact Assessment (EIA).

The proposed development at its closest point (Option 3) is 1,88km from Malelane Aerodrome (FAMN). Using the DFFE screening tool, Nsovo has identified the site as having high aviation sensitivity for the aerodrome. Accordingly, a specialist Civil Aviation Sensitivity Study (CASS) and CA 139-27 Obstacle Approval Application is required. Should the CASS confirm this sensitivity, further consultation with the SA Civil Aviation Authority (SACAA) may be required, which may trigger further specialist studies, as a pre-requisite to the CAA issuing a Compliance Statement for purposes of environmental approval.

In the first instance, therefore, the scope of the study is to undertake a CASS. While based primarily on the requirements of the DFFE Protocol, the study also references various standards and recommended practices of the International Civil Aviation Organisation (ICAO), the SA Civil Aviation Authority (SACAA) and Air Traffic and Navigational Services SOC Limited (ATNS). These include, inter alia:

- The Civil Aviation Act No. 13 of 2009
- Draft White Paper on Civil Aviation Policy, 2017
- ICAO Annex 14, Volume 1: Aerodrome Design and Operations (see Appendix 6.4 & 6.5)
- SA Civil Aviation Regulations (CARS): Part 139 – Aerodromes and Heliports
- SA Civil Aviation Technical Standards (CATS): SACATS 139.01.30 (26th Amendment) – Obstacle Limitations and Markings Outside Aerodromes or Heliports (Appendix 6.2)
- Associated provisions of SACATS 139.02.2 – Aerodrome Design Requirements
- ATNS Database of civil aviation airspace in South Africa, February 2024.

3 Scope and Methodology

While prepared in accordance with industry best-practice for environmental Specialist Studies, the study also references applicable CAA guidelines, since there is some overlap. To meet this requirement, GWI Aviation Advisory utilises methodologies as outlined in SACAA document "Technical Guidance Material for conducting Aeronautical Studies or Risk Assessment" effective January 2022 (Appendix 6.3) and also notes recent amendments (in December 2023) to the Civil Aviation Regulations, which will affect the operational phase of the project.

In essence, the study comprises the following elements:

- Initiation – Identification of potential impacts and risk issues
- Technical analysis
- Compliance assessment
- Risk Assessment – Estimation, Evaluation and Control
- Action and Monitoring, including Risk Mitigation (as required).

3.1 Environmental Triggers

An Environmental Authorisation application is required in terms of the Environmental Impact Assessment Regulations (EIA Regulations, 2014) published in Government Notice (GN) No. 982 of 4 December 2014 (as amended by GN No. 571 of June 2021), based on Chapter 5 of the National Environmental Management Act, 1998 (NEMA, Act No. 108 of 1998).

The EIA Regulations, 2014 provide for control over certain listed activities. These listed activities are detailed in Listing Notice 1 (LN1), Listing Notice 2 (LN2) and Listing Notice 3 (LN3), as amended by GN No. 517 of June 2021). The undertaking of activities specified in the Listing Notices is prohibited until Environmental Authorisation has been obtained from the competent authority.

This application is submitted in terms of the EIA Regulations, 2014

A full description of the listed activities applied for follows:

Listed Activity		Describe the portion of the proposed project to which the applicable listed activity relates.
Applicable activities listed under the EIA Regulations of 2014 as amended – Listing Notice 1		
GNR 983 **Activity 11 (ii)**	*The development of facilities or infrastructure for the transmission and distribution of electricity-* *(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or* *(ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more, excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is-* *(a) temporarily required to allow for maintenance of existing infrastructure;* *(b) 2 kilometers or shorter in length;* *(c) within an existing transmission line servitude; and* *(d) will be removed within 18 months of the commencement of development.*	The project involves the transmission powerline with a capacity of 275kV and/or 132kV inside an urban area, from the power station to the Khanyazwe substation.
GNR 983 Activity 24	*"The development of a road:* *(ii) A road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters."*	The proposed project will require the development of a 10m wide access road to the development site along the pipeline and powerline, which will also serve as a service road during the operational phase.
GNR 983 Activity 27	*The clearance of an area of 1 hectare or more but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for—*	The proposed power station will require a footprint clearance of approximately 15ha of vegetation.

Listed Activity		Describe the portion of the proposed project to which the applicable listed activity relates.
	(i) the undertaking of a linear activity; or *(ii) maintenance purposes undertaken in accordance with a maintenance management plan.*	
GNR 983 Activity 28	Residential, mixed, retail, commercial, industrial, or institutional developments where such land was used for agriculture, game farming, equestrian purposes, or afforestation on or after 01 April 1998 and where such development: (i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares or excluding where such land has already been developed for residential, mixed, retail, commercial, industrial, or institutional purposes.	The proposed facility will be developed in an urban area that is currently used for agriculture. The footprint of the development will be bigger than 5 hectares.
Applicable activities listed under the EIA Regulations of 2014 as amended – Listing Notice 2		
GNR 984, Activity 2	*"The development and related operation of facilities or infrastructure for generating electricity from a non-renewable resource where the electricity output is 20 megawatts or more".*	The proposed project entails the development of a gas-to-power facility with a maximum output of 800 MW and associated infrastructure.
GNR 984, Activity 4	*The development and related operation of facilities or infrastructure, for storing, storing, and handling a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres.*	The project proposes commissioning ±20 LNG tanks with a combined capacity to store 14000m³ LNG.
GNR 984, Activity 5	*The development and related operation of facilities or infrastructure for the processing of a petroleum resource, including the beneficiation or refining of gas, oil, or petroleum products with an installed capacity of 50 cubic*	The proposed project intends to liquefy and vaporize gas and develop an LNG truck loading/offloading facility.

Listed Activity		Describe the portion of the proposed project to which the applicable listed activity relates.
	meters or more per day, excluding activities that are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act 59 of 2008), in which case the National Environmental Management: Waste Act, 2008 applies.	
GNR 984, Activity 6	*"The development of facilities or infrastructure for any process or activity which requires a permit or license or an amended permit or license in terms of national or provincial legislation governing the generation or release of emissions, pollution or affluent."*	The proposed development of the gas-to-power plant will require an Atmospheric Emission License (AEL) in terms of the National Environmental Management: National Environmental Air Quality Act (Act 39 of 2004) (NEMAQA) for the burning of natural gas.
GNR 984, Activity 7	*"The development and related operation of facilities or infrastructure for the bulk transportation of dangerous goods-* *i. in gas form, outside an industrial complex, using pipelines, exceeding 1 000 meters in length, with a throughput capacity of more than 700 tons per day".*	The proposed project entails the development of a gas pipeline from the existing ROMPCO gas pipeline to the power plant.
GNR 985, Activity 4	*The development of a road wider than 4 metres with a reserve less than 13.5 metres.* *In Mpumalanga* *(i) (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the*	The proposed project will require the development of a 10m wide access road to the development site along the pipeline and powerline, which will also serve as a service road during the operational phase.

Listed Activity		Describe the portion of the proposed project to which the applicable listed activity relates.
	core areas of a biosphere reserve, excluding disturbed areas; or".	

Table 1: Listed Activities applicable to the Project

3.2 DFFE Protocol of March 2020

A '*Protocol for the specialist assessment and minimum report content requirements for environmental impacts on civil aviation installations'* was gazetted by the DFFE as GN No.320 in the Government Gazette 43110 on 20th March 2020. The Protocol is attached as Appendix 6.6.

In terms of the Protocol, the EAP is required to undertake an initial review of the subject site, utilizing the Screening Tool developed by the DFFE, to assess the potential impact of the proposed development on adjoining civil aviation installations.

The Screening Tool uses distance as an indicator of sensitivity. If the proposed site is:

1. Between 15 and 35km from a civil aviation radar, or
2. Between 15 and 35km from a major civil aviation aerodrome, or
3. Between 8 and 15km of other civil aviation aerodromes

then a sensitivity rating of medium or high is assigned, which triggers a CASS.

In terms of the Protocol:

- ***If the outcome of (the Specialist's) site sensitivity verification justifies a sensitivity of medium or higher, then a Civil Aviation Compliance Statement is required.***
- ***If the outcome of (the Specialist's) site sensitivity verification indicates low sensitivity then there are no further requirements.***

3.3 Initial Assessment

The proposed development was assessed by Nsovo using the Screening Tool and a high sensitivity assigned on account of the proximity to Malelane (FAMN) aerodrome, less than 8km away.

Based on the preliminary sensitivity rating, GWI was appointed by Nsovo to undertake a CASS to verify or adjust the rating. The credentials of GWI and relevant CV's of resources deployed on the study are attached to this report as Appendix 6.7.

If the CASS determines that a Compliance Statement is required for environmental purposes, an extended Aeronautical Study may be requested by the SACAA.

3.4 Specialist Study Elements

The study comprised the following elements:

3.4.1 Obstacle Assessment

Using ICAO Annex 14 and the relevant SACAA CARS/CATS standards, relevant OLS's were reviewed and the risk to these surfaces presented by the proposed development and associated infrastructure assessed.

3.4.2 Airspace Analysis

Using the SACAA Aerodrome Directory and the Aeronautical Information Publication (AIP) information on the aerodrome, airspace classification sourced from the Air Traffic and Navigational Services Corporation (ATNS) and available topographical data, the proposed development site was overlaid on the airspace classification map of the environs and risk posed to aircraft operating in the area assessed.

3.4.3 Radar, Navigation and RF Interference Assessment

Using information available from the SACAA and ATNS, the location of civil aviation radar and other navigational equipment and infrastructure within the guideline distances (per the US FAA) from the proposed development were determined and the risk posed to the operation of these installations assessed.

3.4.4 Other Potential Impacts

The likelihood was assessed of any construction materials presenting significant glint and glare risk.

Based on the above studies, the risk status of the development was determined.

4 Specialist Study Outputs

4.1 Obstacle Limitation Surfaces

ICAO requires the determination of various obstacle limitation surfaces (OLS's), which vary according to the aerodrome reference code (ARC) of a specific aerodrome. Figure 1 illustrates. Essentially, an OLS is an imaginary surface in the air beyond which an object may not penetrate, unless otherwise motivated through a detailed Aeronautical Study. OLS's vary in size, slope, and extent according to the ICAO ARC of the affected aerodrome, which is typically based on runway length and width, referenced to standard atmospheric conditions at sea level. Figure 2 illustrates. Appendix 6.10 contains further details of the ICAO Annex 14 standards applicable to various ARC's under different infrastructural and operational conditions.

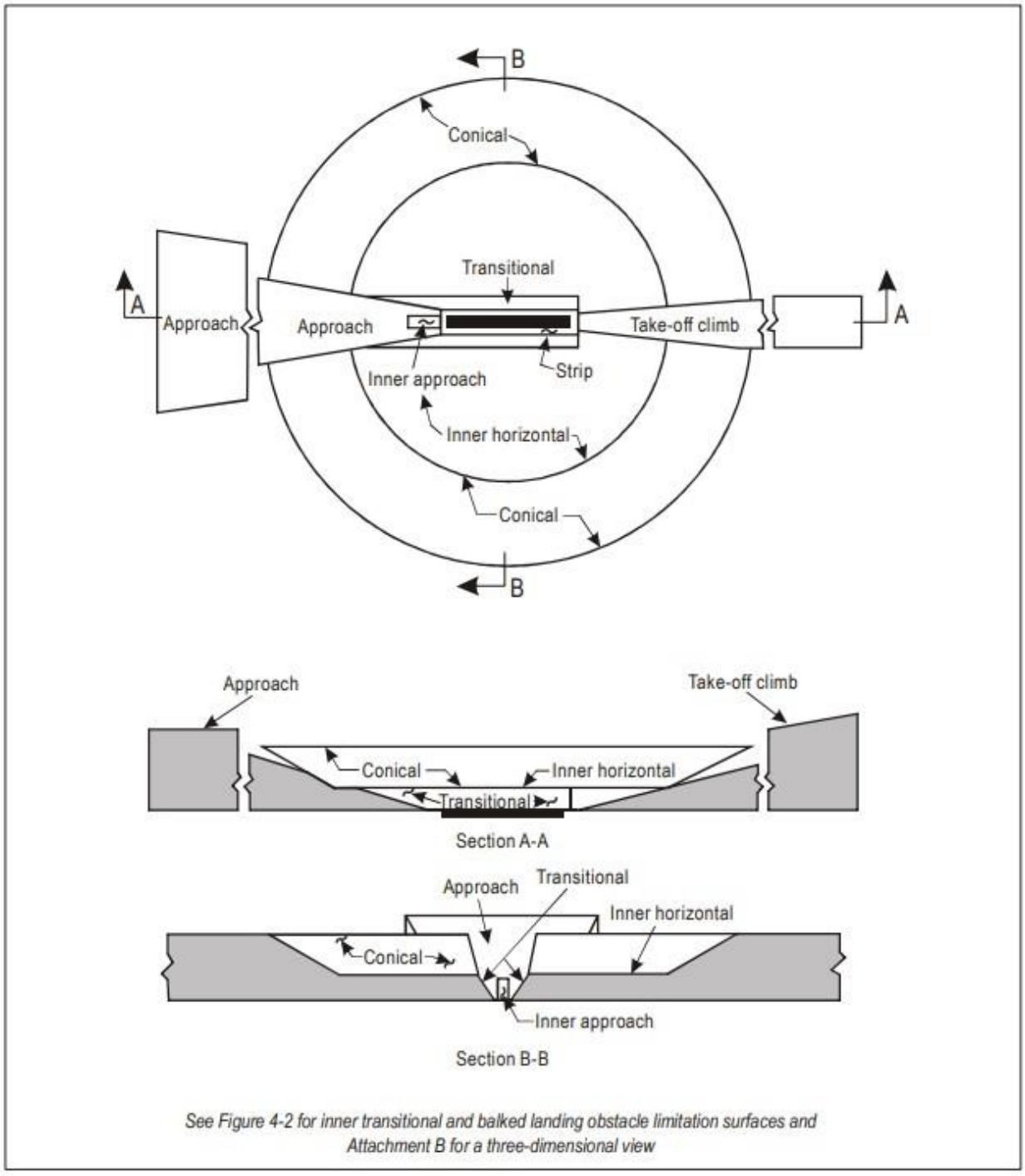

Figure 1: ICAO Obstacle Limitation Surfaces

Table 1-1. Aerodrome reference code
(see 1.6.2 to 1.6.4)

Code element 1	
Code number	Aeroplane reference field length
1	Less than 800 m
2	800 m up to but not including 1 200 m
3	1 200 m up to but not including 1 800 m
4	1 800 m and over
Code element 2	
Code letter	Wingspan
A	Up to but not including 15 m
B	15 m up to but not including 24 m
C	24 m up to but not including 36 m
D	36 m up to but not including 52 m
E	52 m up to but not including 65 m
F	65 m up to but not including 80 m

Note 1.— Guidance on planning for aeroplanes with wingspans greater than 80 m is given in the Aerodrome Design Manual *(Doc 9157), Parts 1 and 2.*

Note 2.— Procedures on conducting an aerodrome compatibility study to accommodate aeroplanes with folding wing tips spanning two code letters are given in the PANS-Aerodromes (Doc 9981). Further guidance can be found in the manufacturer's manual on aircraft characteristics for airport planning.

Figure 2: ICAO Aerodrome Reference Codes (ARC)

The general location of the aerodrome (FAMN) potentially affected by the proposed development is illustrated in Figure 3.

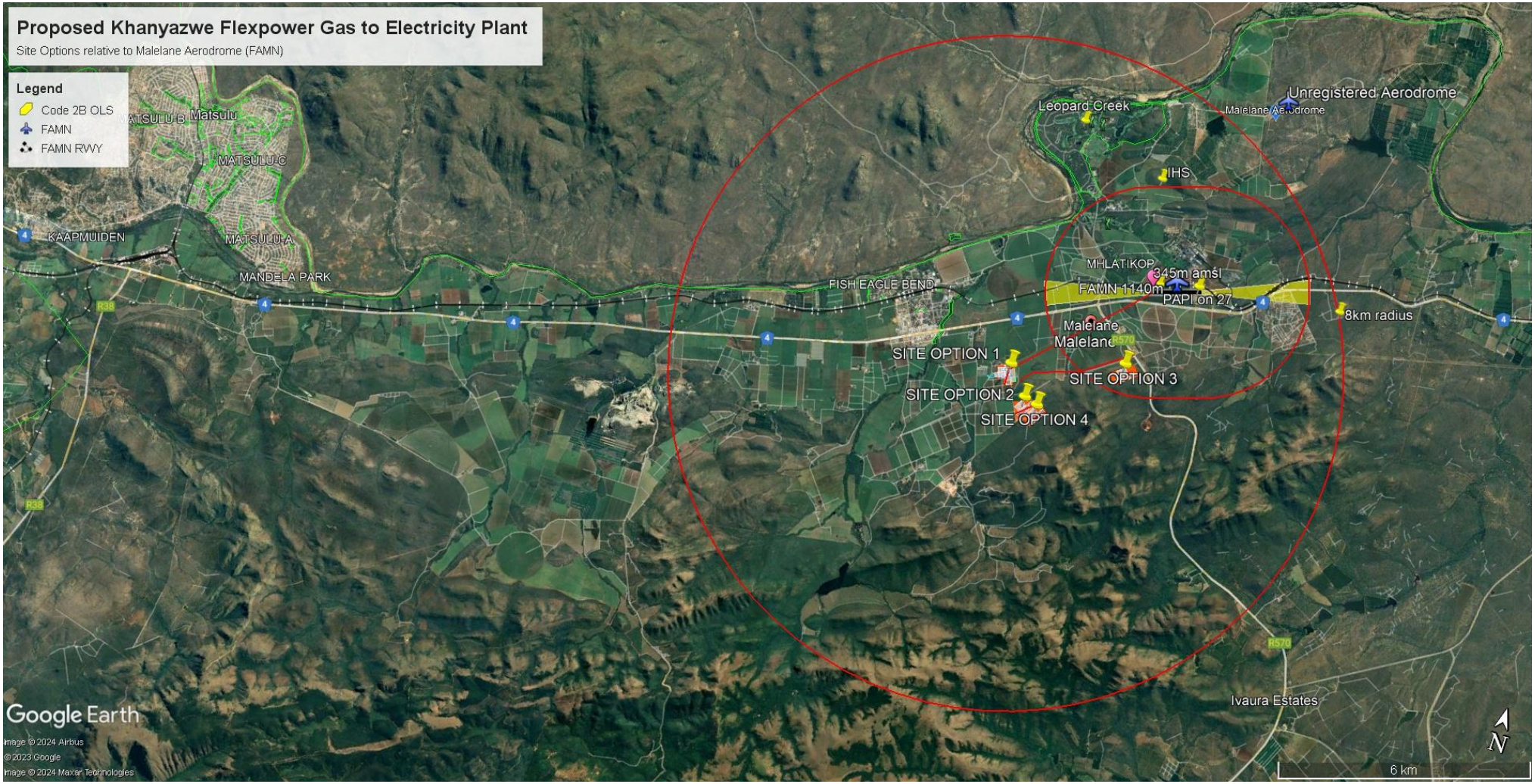

Figure 3: Location of Proposed Site relative to Malelane Aerodrome (FAMN)

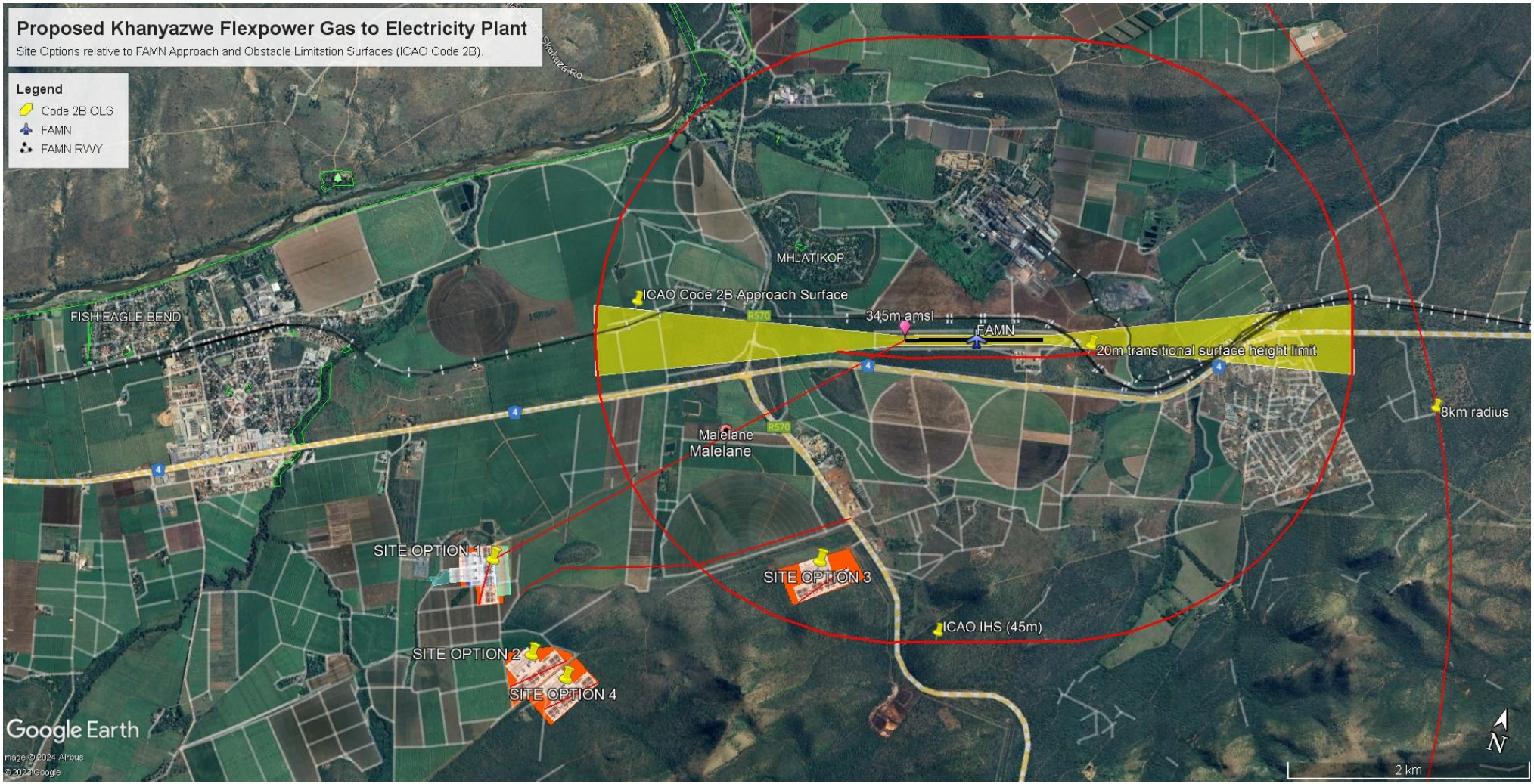

Figure 4: Location of Proposed Site Options relative to FAMN Approach and Obstacle Limitation Surfaces

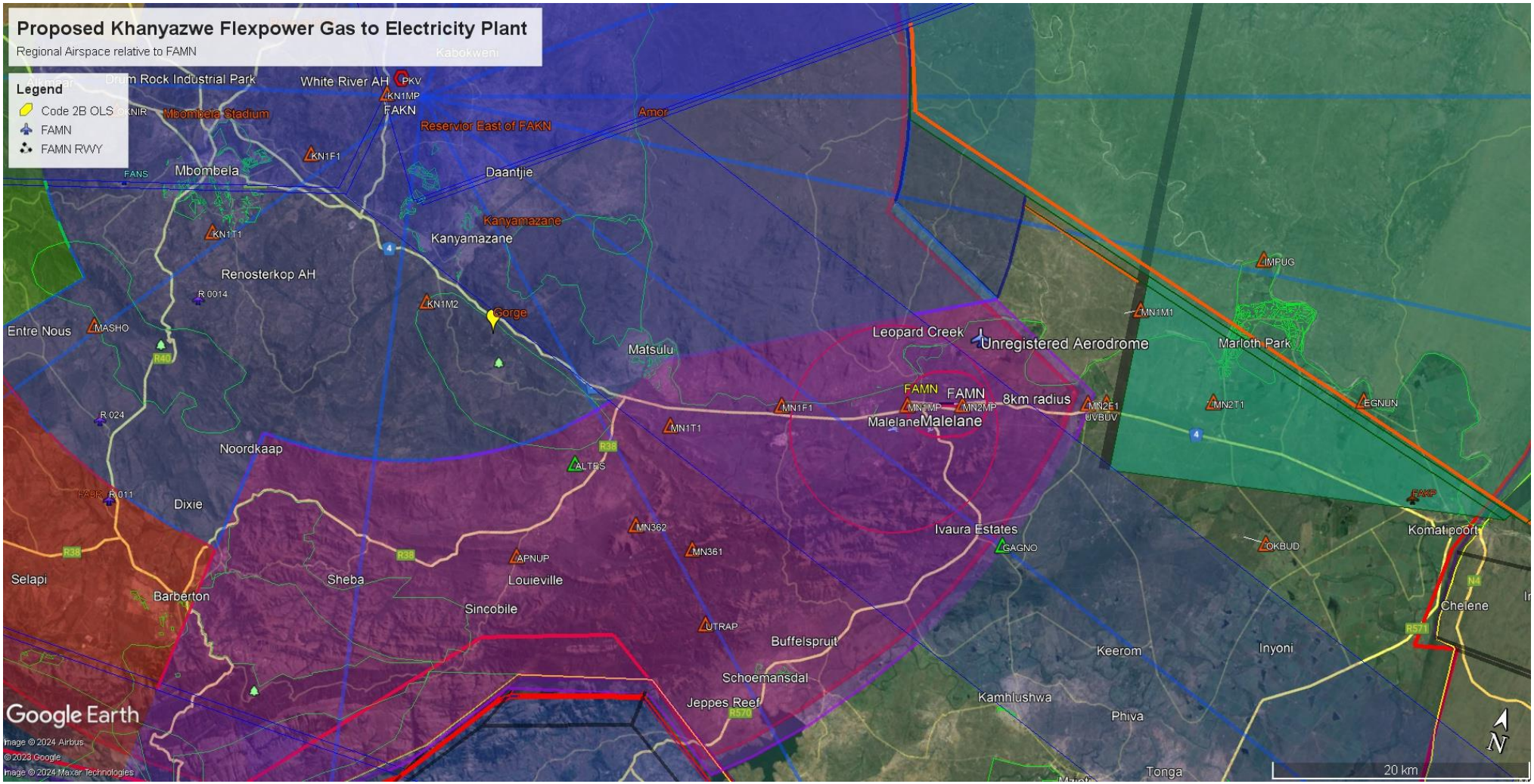

Figure 5: Location of Proposed Site relative to Regional Airspace

4.1.1 Malelane Aerodrome (FAMN) Classification

Based personal observation on site visits, SACAA AD and AIP information, the status of FAMN is summarised below:

- The aerodrome is an unmanned aerodrome.
- FAMN is licensed as a SACAA Category 2 airfield.
- There is another unlicensed, but CAA registered aerodrome R326 nearby, but this is beyond 8km away from the proposed site.
- Limited aerodrome services exist at FAMN, being a Precision Approach Path Indicator (PAPI) visual landing guidance system. This operates using lights that allow pilots to determine their position relative to the approach guide slope. There is no runway centreline or airfield lighting.
- The aerodrome operates under Visual Flight Rules (VFR).
- Malelane RWY 09/27 is 1 248x18m tar-surfaced with 2,5m gravel shoulders, classified as ICAO Code 2B since the RFL (reference field length) is slightly under 1 200m under optimal conditions.
- Reference altitude is 1153ft amsl.

The SACAA relevant Aerodrome Information Publication (AIP) information on FAMN is:

AIP South Africa

AD 2-FAMN-1
15 JUL 22

FAMN

AD 2.1 AERODROME LOCATION INDICATOR AND NAME

FAMN - MALELANE

AD 2.2 AERODROME GEOGRAPHICAL AND ADMINISTRATIVE DATA

1	*ARP co-ordinates and site at AD*	252824.00S 0313356.00E Mid-point of aerodrome
2	*Direction and distance from city*	3.8 NM E MALELANE
3	*Reference elevation/Reference temperature*	1153FT
4	*Geoid undulation at aerodrome elevation position*	51.3 FT
5	*MAG VAR* *annual change*	19°W (2018) 0°7' W
6	*AD Operator, address, telephone, telefax, e-mail, AFS address and, if available, website address.*	Malelane Airport (RCL FOODS) P O Box 47 MALELANE, 1320 Contact Person: Ina de Bruyn (+27)13 791 1112 Office hours (+27)79 888 2233 (After hours) Email: ina.debruyn@rclfoods.com TEL: For landing Clearance: (+27)13 791 1484 Fax: (+27)86 619 7958
7	*Types of traffic permitted (IFR / VFR)*	IFR/VFR
8	*Remarks*	NIL night flying.

AD 2.6 RESCUE AND FIRE FIGHTING SERVICES

1	*Aerodrome category for fire fighting*	NIL
2	*Rescue equipment*	NIL
3	*Capability for removal of disabled aircraft*	NIL
4	*Remarks*	NIL

AD 2.12 RUNWAY PHYSICAL CHARACTERISTICS

Designations RWYNR	*TRUE &MAG BRG*	*Dimensions of RWY (M)*	*Strength (PCN) and surface of RWY and SWY*	*THR coordinates RWY end coordinates THR geoid undulation*	*THR elevation and highest elevation of TDZ of precision APP RWY*
1	*2*	*3*	*4*	*5*	*6*
09	072°T	1248 x 18	ASPH LCN 17	252831.15S 0313335.86E	THR: 1127FT
27	252°T	1248 x 18	ASPH LCN 17	252819.70S 0313414.99E	THR: 1153FT
Designations RWY NR	*Slope of RWY-SWY*	*SWY dimensions (M)*	*CWY dimensions (M)*	*Strip dimensions (M)*	*OFZ*
1	*7*	*8*	*9*	*10*	*11*
09	+0.82%	NIL	NIL	NIL	NIL
27	-0.82%	200 X18	NIL	NIL	NIL

Remarks 12
Note: Slope in strip area; 10% in places.
1) ACFT must adhere to RWYs and TWYs.Park in the parking area facing south and keeping clear of taxiways at all times.
2) Grass cutting next to RWY.

AD 2.13 DECLARED DISTANCES

RWY	TORA (M)	TODA (M)	ASDA (M)	LDA (M)	Remarks
1	2	3	4	5	6
09	1248	1248	1248	1248	NIL
27	1248	1248	1448	1148	DTHR 100M

Figure 6: RSA AIP FAMN Aerodrome Information

For a Code 2 runway ICAO Annex 14 Ch 4.2 requires the determination of Obstacle Limitation Surfaces (OLS's) as follows:

Non-precision approach runways

4.2.7 The following obstacle limitation surfaces shall be established for a non-precision approach runway:

— conical surface;
— inner horizontal surface;
— approach surface; and
— transitional surfaces.

Figure 7: ICAO OLS's for Non-precision approach runways

By reference to Figure 1 and Appendices 6.4, 6.5 and 6.10 there are two potentially influential ICAO OLS's, being the inner horizontal and the approach surface. There are also other requirements imposed by the SACAA in terms of Part 139.01.30, which deals with the approval of obstacles above 45m high within 8km of aerodromes, which supersedes the ICAO conical surface.

4.1.2 Inner Horizontal & Conical Surfaces & CAA 8km limitation of objects

The ICAO inner horizontal surface (IHS) extends to 2,5km from any point on the runway, and limits objects within this radius to 45m relative to the runway level.

The ICAO conical surface (CS) commences at 2,5km from the runway, and extends for another 1 200m to a height of 60m above the IHS (per ICAO standards), giving a total elevation of 105m above the runway level, measured at the closest point to the runway. However, this is superseded by the CAA requirement to limit obstacles within 8km of aerodromes to 45m unless otherwise approved.

Option 1 is 3.70km from the runway, at its closest point. This is within the CAA 8km limit and is therefore affected. The elevation of the FAMN airport is 1153ft/351.52m above sea level while the site elevation of the Option 1 is 1158ft/353.05m. Therefore, the construction of a structure that is 30m in height, at this location, effectively means that the structure will be 31.52m above the surface of the runway, which is within the limitations of the CAA requirements (Table 2).

Option 2 is 3.78km from the runway, at its closest point. This is also within the CAA 8km limit and is therefore affected. The elevation of the FAMN airport is 1153ft/351.52m above sea level while the site elevation is 1240ft/ 378,05m. Therefore, the construction of a structure that is 30m in height at this location, effectively means that the structure will be 185,60ft/ 56.2m above the surface of the runway, which exceeds the 45m limitation of the CAA requirements (Table 2). However, between the FAMN runway and the Option 2 site, there is terrain (25°30'09,69"S 31°32'34,02"E) which is 455m amsl and reaching 47m above the height of the proposed structure. This therefore mitigates the effect of the Option 2 because, in as much as it infringes the 45m limitation, if falls below the splay of the terrain between it (Option 2) and the airport (Table 3).

Option 3 is 1.77km from the runway, at its closest point and is therefore within the ICAO IHS, which limits objects to 45m. It is also close to, but just beyond the ICAO Transitional surface (TS), which requires consideration. The TS slopes upwards at a grade of 1 in 5 from a point 40m from the runway, so at the Option 3 site would be located at over 300m above the runway level, so is clearly superseded by the IHS. Additionally, the elevation of the FAMN airport is 1153ft/ 351.52m above sea level while the site elevation of Option 3 is 1322ft/ 403,05m. Therefore, the construction of a structure that is 30m in height, at this location, effectively means that the structure will be 81.52m above the surface of the runway, which exceeds the 45m limitation of the CAA requirements by 36m (Table 2).

Option 4 is 3.84km from the runway, at its closest point. This is within the CAA 8km limit. The elevation of FAMN airport is 1153ft/ 351,52m above sea level, while the site elevation is 1283ft/ 391,16m. Therefore, the construction of a structure that is 30m in height, at this location, effectively means that the structure will be 63,63m above the surface of the runway, which exceeds the 45m limitation of the CAA requirements. However, between the FAMN runway and the Option 4 site, there is terrain (25°30'1.68"S 31°32'52.86"E) which is 459m amsl and reaching 38m above the height of the proposed structure. This therefore mitigates the effect of the Option 2 because, in as much as it infringes the 45m limitation, if falls below the splay of the terrain between it (Option 3) and the airport (Table 3).

The above are illustrated in Table 2 below, which identifies Option 1 as compliant with the IHS, the CS and the 8km limitations of objects. Option 3 requires further approvals from the CAA.

Option No	Site Elevation in Ft	Site Elevation (m)	Top of 30m Structure	Effective Height	Limitation Infringement (45m)
FAMN (refeference)	**1153**	**352**	**352**	**0**	**0**
1	1158	353	383	32	**-13**
2	1240	378	408	57	**12**
3	1322	403	433	82	**37**
4	1283	391	421	70	**25**

Table 2: IHS, CS and SACAA OLS Results

Furthermore, Table 3, below, identifies Options 2 and 4 as also viable due to the existence of terrain, between each of the sites and the FAMN airport, which is higher than the height of the proposed structure(s).

Highest Obstacle in between Option and FAMN					
Option No	Coordinates	Bearing from FAMN	Distance from FAMN (km)	Height (m)	Height above Structure (m)
FAMN (refeference)	**N/A**	**N/A**	**0**	**352**	**0**
1	25°28'59,10"S 31°33'05,42"E	246°	1,2	351	**-32**
2	25°30'09,69"S 31°32'34,02"E	209°	3,44	455	**47**
3	25°29'33.06"S 31°33'31.28"E	184°	1,87	393	**-40**
4	25°30'1.68"S 31°32'52.86"E	203°	2,99	459	**38**

Table 3: Obstacles between FAMN and the Various Options

4.1.3 Approach and Take-off Climb Surfaces to RWY09/27

The critical approach surface is that to RWY09 for all the 4 options, which begins 2,56 km from the threshold of RWY09 (per ICAO). However, any aircraft approaching RWY09 would not traverse the proposed sites at all, but remain at least:

1,57 km away for Option 1

2,27km away for Option 2

1,6km away for Option 3

2,3km away for Option 4 (refer Figure 4).

All site options are outside the approach surfaces, but technically within the ICAO conical surfaces, which however are superseded by CARS 139.01.03, which is equivalent to the ICAO IHS.

The SACAA has more stringent requirements than ICAO Annex 14 for objects within 8km of licensed aerodromes, being a height limit of 45m above the runway elevation at the nearest point to the obstacle. This is addressed above (4.1.2) and objects would in all cases have to comply with CATS 139-27 (obstacle approval process) before being erected. From an environmental perspective, however, sensitivity is considered low.

4.1.4 Risk Assessment

Appendix 6.3 contains SACAA guidelines for assessment of risk, based on (a) the severity of risk associated with an event and (b) the likely consequence. In this case, the most severe event would be the consequence of an aircraft impacting an obstacle on the site or being affected by debris resulting from on-site activities, or the unlikely event of a major gas explosion. The approach is thus based on a 'with the development' versus a 'without the development' scenario. Based on Table 4, the risk of Options 1, 2 and 4 are assessed as '1A', with Option 3 assessed at '3A'.

RISK PROBABILITY		RISK SEVERITY				
		Catastrophic A	Hazardous B	Major C	Minor D	Negligible E
Frequent	5	5A	5B	5C	5D	5E
Occasional	4	4A	4B	4C	4D	4E
Remote	3	3A	3B	3C	3D	3E
Improbable	2	2A	2B	2C	2D	2E
Extremely Improbable	1	1A	1B	1C	1D	1E

Table 4: Risk Assessment Matrix

Appendix 6.3 also outlines the range of risk tolerability, as illustrated in Table 4. In this case, the risk tolerability for Options 1, 2 and 4 are deemed 'acceptable', indicating no risk mitigation required from the developer in terms of CATS 139.30, relating either to the development activities or the marking of obstacles. Option 3, however, rates as 'intolerable' and if this option is selected, various mitigation would be required.

In the case of aircraft operating near FAMN, the standard operating procedures (PANS/OPS) laid down in the CARS (including Parts 91, 135 and 121) provide for risk mitigation in the event of aircraft failure or other unexpected events, supplemented by the CATS relevant to operating of aircraft close to sites where blasting operations or other risk events are likely to occur. This scenario, however, is only likely in the future – i.e. after the site selection has been finalised.

TOLERABILITY LEVEL	ASSESSED RISK INDEX	SUGGESTED CRITERIA
Intolerable	5A, 5B, 5C, 4A, 4B, 3A	Unacceptable in the existing circumstances
Tolerable	5D, 5E, 4C, 4D, 4E, 3B, 3C, 3D, 2A, 2B, 2C	Acceptable based on risk mitigation – may require a Management decision
Acceptable	3E, 2D, 2E, 1A, 1B, 1C, 1D, 1E	Acceptable

Table 5: Risk Tolerability Matrix

4.2 Airspace Analysis, Radar and Communications Assessment

From Fig 5, it was determined that:

- There are no civilian radar facilities within 35km of the proposed prospecting site.
- The airspace around FAMN is uncontrolled.
- The airspace classification of the environs around FAMN is indicated in Fig 5.
- There are no civilian radar facilities at FAMN.
- The closest ground-based navigational equipment is a VOR/DME array 'PKV' at Kruger Mpumalanga International Airport, some 50 km NW of the proposed facility.
- The closest commercial aerodrome is Kruger Mpumalanga International Airport (KMIA), some 50km to the northwest.

The risk of any impact of the facility on nearby civilian radar installations is thus **low**.

The SACAA AIP information of FAMN was also assessed and it was determined that there are no known ground-based navigational aids located within 15km of the development site.

Risk was thus assessed as 1E.

RISK PROBABILITY		RISK SEVERITY				
		Catastrophic A	Hazardous B	Major C	Minor D	Negligible E
Frequent	5	5A	5B	5C	5D	5E
Occasional	4	4A	4B	4C	4D	4E
Remote	3	3A	3B	3C	3D	3E
Improbable	2	2A	2B	2C	2D	2E
Extremely Improbable	1	1A	1B	1C	1D	1E

Table 6: Risk Assessment Matrix

Similarly, also using the Appendix 6.3 guidelines, the risk tolerability has been assessed as 'Acceptable'.

TOLERABILITY LEVEL	ASSESSED RISK INDEX	SUGGESTED CRITERIA
Intolerable	5A, 5B, 5C, 4A, 4B, 3A	Unacceptable in the existing circumstances
Tolerable	5D, 5E, 4C, 4D, 4E, 3B, 3C, 3D, 2A, 2B, 2C	Acceptable based on risk mitigation – may require a Management decision
Acceptable	3E, 2D, 2E, 1A, 1B, 1C, 1D, 1E	Acceptable

Table 7:Risk Tolerability Matrix

4.3 Other Potential Impacts – Glint and Glare

Only Option 3 (at1,77km) is within the 3km usually regarded as the limit within which 'glint and glare' issues might become problematic for facilities (such as proposed) where highly reflective materials are likely to be used. A detailed glint and glare assessment would only be required if this option is preferred for some other reason. From an aviation perspective, however, Options 1,2 and 4 are preferred, and are considered low risk from a glint and glare viewpoint.

In addition, since the development options are all located south of the FAMN runway, which is oriented substantially E-W, the sun is unlikely to ever be at a low enough angle relative to any approaching aircraft, to cause reflection concerns, especially since the substantial use of high reflectivity materials is unlikely.

There are flight routes between FAKN (Kruger Mpumalanga International Airport) and FQMA (Maputo International Airport) which are the T125 (from FL200 to Fl245 and UT125 from FL245 to FL410). There is also a conventional Route (G745 from FL145 to FL195) also linking FAKN to FQMA. All these routes place aircraft potentially overhead the proposed site options. However, there are no scheduled airline operators servicing this route. Non-commercial air traffic utilising these routes is estimated at fewer than 10 flights per week (as confirmed by frequent reference to 'Flight Radar24'). The higher altitudes (the lowest being 13 000Ft/ 4km or higher, above the 4 Options) of these aircraft and the E-W orientation of this route makes them unlikely to be affected by glare issues from all 4 Options.

There is a daily scheduled flight that routes between FAKN and FALE (King Shaka International Airport). The first flight arrives at FAKN from FALE at approximately 11:40 (local time) and the second flight departs from FAKN, to FALE at approximately 14:00 (local time). When Runway 05 is in use at FAKN, it is the departing flight which might, due to ATC Procedural Clearances, route overhead the proposed Options, and when Runway 23 is in use at FAKN, it is the arriving flight that might cross overhead the proposed options. However, due to the high altitude (minimum of 9000ft/ 2.7km or higher, above the 4 Options), they are thus most unlikely to be affected by glare issues.

5 Recommendations

The analysis contained in this Aeronautical Study has determined:

1. The proposed development and associated ground-based infrastructure for Option 1 is compliant with all relevant ICAO Annex 14 and SACAA (CARS and CATS) standards in respect of obstacle limitation surfaces and can therefore be supported **for purposes of environmental approval**. Options 2 and 4 are not compliant with the CAA 45m limitation within the 8km radius. However, they are mitigated by the existence of high lying terrain between the sites and the FAMN airport, which screens the proposed structures. These options can therefore be supported for purposes of environmental approval. Option 3 is not compliant with the CAA 45m limitation within 8km radius of an airport and would require further mitigations and approvals from the CAA, if selected.

2. The proposed development for all 4 Options will not materially impact civilian radar, navigation or communications infrastructure in the environs, nor present any material additional risks to operations at Malelane Aerodrome, currently or in the future.

   On this basis, the recommendation of this CASS is that the sensitivity status of the proposed development be amended to 'low' for Options 1, 2 and 4.

   However, the sensitivity status for Option 3 is recommended to remain as 'high' and requires a further extension of the scope to include a full Aeronautical Study, if requested by the CAA, and procure a Civil Aviation Compliance Statement, in the event that there are other considerations (non-aviation sensitivities) which make Options 1, 2 or 4 less feasible.

3. Once site selection is complete,the CAA Obstacle Approval process per CA139.27 will need to be complied with.

6 Appendices

6.1 Glossary of Terms

The definitions listed below apply to this document. Definitions have been taken from Wikipedia, where applicable.

TERM	ACRONYM	DEFINITION
Aeronautical Flight Information Systems	AFIS	Wind, weather and other operational information available to aircraft operators at airfields that do not have fully-fledged control tower facilities
Aircraft Classification Number	ACN	An indication of runway strength requirements of aircraft, which must not exceed the corresponding Pavement Classification Number (PCN) of the airfield
Aeronautical Information Publication	AIP	A document published and regularly updated by the SA Civil Aviation Authority containing key details and parameters of licensed aerodromes, in accordance with the SA Civil Aviation Regulations.
Aeronautical Information Circular	AIC	A document 'for information only' issued by the SA Civil Aviation Authority containing basic details of aerodromes (usually) registered with the SACAA, but not licensed.
Air Traffic Control	ATC	A system of ground-based services that manage the safe and efficient movement of aircraft within controlled airspace and on the ground at airports. The primary objectives of air traffic control are to prevent collisions between aircraft, provide safe and orderly flow of air traffic, and ensure efficient utilization of airspace and airport resources.
Air Traffic and Navigational Services SOC Limited	ATNS	A State-owned Enterprise formed in 1993, responsible for overall air traffic and airspace management in South Africa.
Airfield Ground Lighting	AGL	Lighting systems on runway, taxiways and apron.
Above Mean Sea Level	AMSL	The vertical measurement of an aircraft's altitude or the elevation of a location with reference to the average sea level. It serves as a standard reference point for altitude calculations, providing a consistent baseline for navigation and airspace management.
Civil Aviation Regulations	CARS	A national aviation authority or civil aviation authority is a government statutory authority in each country that maintains an aircraft register and oversees the approval and regulation of civil aviation.
Civil Aviation Technical Standards	CATS	A set of technical standards and industry best practices, to be read in conjunction with the CARS.
Distance Measuring Equipment	DME	Electronic distance measuring capability of VHF radio antennae.
Flexible Use of Airspace	FUA	A policy of the SACAA in terms of which airspace is not unnecessarily restricted, allowing more effective use as long as safety standards are not compromised.
General Aviation	GA	Private, recreational, pilot training and non-scheduled commercial air services
Global Navigational Satellite System	GNSS	Satellite based aircraft navigational systems relying on GPS technology
Integrated Development Plan	IDP	An Integrated Development Plan is a plan for an area that gives an overall framework for development. It aims to co-ordinate the work of local and other spheres of government in a coherent plan to improve the quality of life for all the people living in an area.
International Civil Aviation Organisation	ICAO	The International Civil Aviation Organization is a specialized agency of the United Nations. It changes the principles and techniques of international air navigation and fosters the planning and development of international air transport to ensure safe and orderly growth.

TERM	ACRONYM	DEFINITION
International Air Transport Association	IATA	The International Air Transport Association is a trade association of the world's airlines. Consisting of 290 airlines, primarily major carriers, representing 117 countries, the IATA's member airlines account for carrying approximately 82% of total available seat miles air traffic.
Instrument Meteorological Conditions	IMC	Weather conditions under which visual operation of aircraft is not possible due to industry visibility limits not being met, which require aircraft to be operated using instrument procedures.
Level of Service	LOS	Level of service to passengers as defined in IATA reference documents
Obstacle Limitation Surfaces	OLS	A set of imaginary planes or surfaces above the ground that sets limits beyond which ground-based objects may not penetrate, to preserve the operational safety of aircraft, as laid down in ICAO reference material, particularly Annex 14.
Passengers	PAX	Number of passengers
Performance Based Navigation	PBN	ICAO recommended policy to improve air traffic management through increased reliance on satellite-based navigation systems and thereby reduce aircraft-based carbon footprint through reduction in approach and 'hold' times of arriving aircraft.
South African Civil Aviation Authority	SACAA	The South African Civil Aviation Authority is the South African national aviation authority, overseeing civil aviation and governing investigations of aviation accidents and incidents.
Safety Health and Environment	SHE	Safety Health and Environment
Service Level Agreement	SLA	A service-level agreement (SLA) is a commitment between a service provider and a client. The most common component of an SLA is that the services should be provided to the customer as agreed upon in the contract.
Request for Information	RFI	A request for information is a common business process whose purpose is to collect written information about the capabilities of various suppliers. Normally it follows a format that can be used for comparative purposes. An RFI is primarily used to gather information to help make a decision on what steps to take next.
Request for Proposal	RFP	A request for proposal is a document that solicits proposal, often made through a bidding process, by an agency or company interested in procurement of a commodity, service, or valuable asset, to potential suppliers to submit business proposals.
Remote Navigation	RNAV	Satellite based navigation systems similar to GNSS
Runway	RWY	According to the International Civil Aviation Organization, a runway is a "defined rectangular area on a land airport prepared for the landing and take-off of aircraft".
Standards and Recommended Practices	SARPS	A set of industry norms as published by ICAO and other recognised industry bodies, which determine best-practice processes and procedures as distinguished from strict regulatory requirements.
Threshold	THD	The defined end of a runway, marked in accordance with ICAO SARPS.
Visual Flight Rules	VFR	Visual flight rules are a set of regulations under which a pilot operates an aircraft in weather conditions generally clear enough to allow the pilot to see where the aircraft is going.
Very high frequency omnidirectional radio antenna	VFOR	Radio antenna that provides position and directional vectoring capability to aircraft. NDB is a non-directional radio-beacon.

TERM	ACRONYM	DEFINITION
Visual Meteorological Conditions	VMC	Meteorological conditions under which visual sight distances (per SACAA rules) allow flight operations to proceed under VFR, without the necessity to resort to instrument procedures.
Work Breakdown Structure	WBS	A work-breakdown structure in project management and systems engineering, is a deliverable-oriented breakdown of a project into smaller components. A work breakdown structure is a key project deliverable that organizes the team's work into manageable sections.

6.2 26th Amendment – CATS 139.01.30

139.01.30

(1) A holder of an aerodrome licence shall monitor a concerned aerodrome and its surroundings to assess permanent or temporary obstacle limitation and penetration surfaces, to establish if any obstacle has an impact on the safety of aircraft operations at such aerodrome.

(2) If an assessment referred to in subregulation (1) identifies any obstacle that negatively impacts on aircraft safety, a holder of an aerodrome licence shall take appropriate action to mitigate the risk and restrict or remove such obstacle.

(3) A holder of an aerodrome licence shall not erect or allow to be erected, without the prior approval of the Director, a building, structure, or object which projects above a slope of 1 in 20 and which is within 3 000 m measured from the nearest point on a boundary of such aerodrome or heliport.

(4) An object, whether temporary or permanent, which projects above the obstacle limitation surfaces within a radius of 8 km as measured from an aerodrome reference point shall be marked as prescribed in Document SA-CATS 139.

(5) An object, whether temporary or permanent, which projects above the obstacle limitation surfaces beyond a radius of 8 km and constitutes a potential hazard to aircraft, shall be marked as prescribed in Document SA-CATS 139.

(6) A holder of an aerodrome licence shall not erect or allow to be erected, without the prior approval of the Director, a building or object which constitutes an obstruction or potential hazard to an aircraft operating in a navigable airspace in the vicinity of an aerodrome, or navigation aid, or which will adversely affect the performance of a radio navigation or ILS.

(7) A holder of an aerodrome licence shall not erect or allow to be erected, without the prior approval of the Director, an object higher than 45 m above the

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mean level of a landing area or within 8 km measured from the nearest point on a boundary of an aerodrome.

(8) A holder of an aerodrome licence shall not erect or allow to be erected, without the prior approval of the Director a building, structure, or object which projects above a slope of 1 in 20 and which is within 3 000 m measured from the nearest point on a boundary of an aerodrome or heliport.

(9) A holder of an aerodrome licence shall not erect or allow to be erected, without the prior approval of the Director, a building, structure or other object which will project above the obstacle limitation surfaces of an aerodrome or heliport.

(10) A person or authority involved in land development, shall not compromise air safety by authorising or developing any land or erecting a building or obstacle on such land.";

(d) the insertion in Subpart 2 in the arrangements of regulations of the following Subpart:

"SUBPART 2: LICENSING AND OPERATION OF AERODROMES

139.02.1 Requirements for licence

139.02.2 Application for licence or amendment thereof

139.02.3 Processing of application for licence or amendment thereof

139.02.4 Adjudication of application for licence or amendment thereof

139.02.5 **|[Issuing]** Issuance of licence

139.02.6 Period of validity

139.02.7 Transferability

139.02.8 Renewal of licence

139.02.9 Licence of intent

139.02.10 Aerodrome design requirements

6.3 SACAA Technical Guidance Material: Aeronautical Studies

SOUTH AFRICAN CIVIL AVIATION AUTHORITY

TECHNICAL GUIDANCE MATERIAL

for Conducting Aeronautical Studies or Risk Assessment Advisory Circular

SUBJECT: GUIDANCE ON CODUCTING AERONAUTICAL STUDIES OR RISK ASSESSMENT

EFFECTIVE DATE: 11 JANUARY 2022

APPLICABILITY

An Aeronautical study or risk assessment may be carried out when aerodrome standards cannot be met as a result of development. Such a study is most frequently undertaken during the planning of a new airport or during the certification of an existing aerodrome.

PURPOSE

An aeronautical study is conducted to assess the impact of deviations from the aerodrome standards specified in Volume Ito Annex 14 to the Convention on International Civil Aviation, SACAR 139 and Part 11, to present alternative means of ensuring the safety of aircraft operations, to estimate the effectiveness of each alternative and to recommend procedures to compensate for the deviation.

1. REFERENCE:

i. ICAO Annex 14 – Volume 1
ii. ICAO Doc 9774 -Manual on Certification of Aerodromes
iii. ICAO Doc 9734 - Safety Oversight Manual
iv. ICAO Doc 9859 -Safety Management Manual
v. Civil Aviation Regulation Part 11- Subpart 4 Procedure for granting of Exemptions and Recognition of Alternative means of Compliance
vi. Civil Aviation Regulation Part 139 -Aerodromes and Heliports
vii. Civil Aviation Regulation Part 140 -Safety Management

2. TERMS AND ABBREVIATIONS:

TERM	DEFINITION
Risk mitigation	The process of incorporating defences or preventive controls to lower the severity and/or likelihood of a hazard's projected consequence.
Safety risk -	The predicted probability and severity of the consequences or outcomes of a hazard.

ABBREVIATION	DESCRIPTION

ATS	Air Traffic Services
CAR	Civil Aviation Regulation
DCA	Director of Civil Aviation
GA	General Aviation
ICAO	International Civil Aviation Authority
SACAA	South African Civil Aviation Authority
SACAR	South African Civil Aviation Regulation
M: ADO	Manager: Aerodrome Operations
E: AI	Executive: Aviation Infrastructure
SM: ADFA	Senior Manager: Aerodromes and Facilities

3. TECHNICAL ANALYSIS

3.1 Technical analysis will provide justification for a deviation on the grounds that an equivalent level of safety can be attained by other means. It is generally applicable in situations where the cost of correcting a problem that violates a standard is excessive but where the unsafe effects of the problem can be overcome by some procedural means which offers both practical and reasonable solutions.

3.2 In conducting a technical analysis, inspectors will draw upon their practical experience and specialised knowledge or consult other specialists in relevant areas.

3.3 When considering alternative procedures in the deviation approval process, it is essential to bear in mind the safety objective of the CAR 139 and the applicable standards so that the intent of the regulations is not circumvented.

4. APPROVAL OF DEVIATIONS

4.1 In some instances, the only reasonable means of providing an equivalent level of safety is to adopt suitable procedures and to require, as a condition of certification, that cautionary advice be published in the appropriate AIS publications.

4.2 The determination to require caution will be primarily dependent on two considerations:

4.2.1 A pilot's need to be made aware of potentially hazardous conditions; and

4.2.2 The responsibility of the DCA to publish deviations from standards that would otherwise be assumed under certificate status.

5. AERONAUTICAL STUDY

5.1 An aeronautical study is a tool used to review aerodrome and airspace processes and procedures to ensure that safety criteria in place are appropriate. The study can be undertaken in a variety of ways using various analytical methods appropriate to the aeronautical study requirements. An aeronautical study should include the use of:

5.1.1 current state review (baseline position)

5.1.2 quantifiable data analysis

5.1.3 stakeholder interviews

5.1.4 safety/risk matrix

5.2 In general, an aeronautical study should be viewed as providing an overarching document giving a holistic view of an aerodrome's operational environment e.g., the macro perspective as compared to a safety case study which is a task specific document e.g., the micro view.

5.3 An aeronautical study may contain many elements; however, risk assessment, risk mitigation and risk elimination are key components.

5.4 An aeronautical study can be undertaken at any time. It is constructed to consider all relevant factors, including traffic volume, mix and distribution, weather, aerodrome role, aerodrome and airspace configuration, surface activity and the efficiency requirements of operators using the service. The scope of studies can range from

minor adjustments to aerodrome configuration, e.g., from the widening of a taxiway to a complete review of aerodrome airspace with the introduction of a new runway.

5.5 The scope of an aeronautical study usually reflects one of three situations:

5.5.1 the existing operation, e.g., the aerodrome, airspace or ATS (or sometimes just a particular part of the operation);

5.5.2 a change to the existing operation;

5.5.3 a new operation.

5.6 Where the aeronautical study is used to consider a change to existing operations or a new operation, it may not initially be possible to provide all the safety assessment and evidence required. An aeronautical study can identify and evaluate aerodrome service options, including service increases or decreases or the introduction or termination of services (such as the introduction of a rapid exit taxiway or removal of a grass runway).

5.7 The goal of risk management in an aeronautical study is to identify risks and take appropriate action to minimise risk as much as is reasonably practicable. Decisions made in respect of risks must balance the technical aspects of risk with the social and moral considerations that often accompany such issues.

5.8 These decisions may have significant impact on an aerodrome's operation and for an effective outcome there should be a level of consensus as to their acceptability among the key stakeholders.

5.9 Aerodrome operators should also undertake aeronautical studies when the aerodrome operating environment changes. These changes are normally precipitated by a trigger event such as a change, or a proposed change in; airspace design, aircraft operations, aerodrome infrastructure or the provision of an air traffic service.

5.10 It is the aeronautical study process that determines the site-specific need for services, and identifies and recommends a course of action, or presents options for decision makers to act upon. In all cases the aeronautical study should document and demonstrate the site-specific need and rationale for the level of service, procedure design or operational requirements.

6. TRIGGER FACTORS

6.1 The aeronautical study is a tool for the aerodrome management to use as part of its operations and strategic planning and is an integral part of the aerodrome's Safety Management Systems.

6.2 One of the purposes of the aeronautical study is to determine levels of operational safety, service or procedures that should apply at a particular location. The decision to undertake this type of study may be triggered by any one or more of a wide range of factors.

6.3 These may include changes to:

6.3.1 The number of movements;

6.3.2 the peak traffic periods;

6.3.3 the ratio of IFR to VFR traffic;

6.3.4 the type of operations - scheduled, General Aviation (GA), training, etc.;

6.3.5 the types, and variety of types, of aircraft using the aerodrome (jet, turboprop, rotary, etc.);

6.3.6 aerodrome layout;

6.3.7 aerodrome management structure;

6.3.8 runway or taxiway and associated manoeuvring areas;

6.3.9 operations of a neighbouring aerodrome or adjacent airspace.

6.4 Feedback about any changes should be sought from aviation stakeholders including pilots, individuals, and other representative groups as part of the study.

6.5 An aeronautical study may be initiated by an aerodrome operator, or another interested party, such as an air traffic service provider or air operators.

7. THE CONCEPT OF RISK

7.1 Risk Management is a key area in an aeronautical study. ICAO Doc 9859: Safety Management Manual defines risk as following:

7.1.1 **Risk mitigation** - The process of incorporating defences or preventive controls to lower the severity and/or likelihood of a hazard's projected consequence.

7.1.2 **Safety risk** - The predicted probability and **severity** of the consequences or outcomes of a hazard.

8. SAFETY RISK

Safety risk management is also a key component of safety management system and aeronautical study. The term safety risk management is meant to differentiate this function from the management of financial risk, legal risk, economic risk and so forth. This section presents the fundamentals of safety risk and includes the following topics:

A. Definition of Safety Risk;
B. Safety Risk Probability;
C. Safety Risk Severity;
D. Safety Risk Tolerability; and
E. Safety Risk Management.

8.1 Definition of Safety risk:

Safety risk is the projected likelihood and severity of the consequence or outcome from an existing hazard or situation. While the outcome may be an accident, an "intermediate unsafe event/consequence" may be identified as "the most credible outcome".

8.2 Safety Risk Probability: (How likely is it that it will occur?)

The process of controlling safety risks starts by assessing the probability that the consequences of hazards will materialize during aviation activities performed by the organization. Safety risk probability is defined as the likelihood or frequency that a safety consequence or outcome might occur. The determination of likelihood can be aided by questions such as:

8.2.1 Is there a history of occurrences similar to the one under consideration, or is this an isolated occurrence?
8.2.2 What other equipment or components of the same type might have similar defects?
8.2.3 How many personnel are following, or are subject to, the procedures in question?
8.2.4 What percentage of the time is the suspect equipment or the questionable procedure in use?
8.2.5 To what extent are there organizational, managerial or regulatory implications that might reflect larger threats to public safety?

Any factors underlying these questions will help in assessing the likelihood that a hazard may exist, taking into consideration all potentially valid scenarios. The determination of likelihood can then be used to assist in determining safety risk probability. The table below presents a typical safety risk probability table, in this case, a five-point table. The table includes five categories to denote the probability related to an unsafe event or condition, the description of each category, and an assignment of a value to each category.

LIKELIHOOD	MEANING	VALUE
Frequent	Likely to occur many times (has occurred frequently)	5
Occasional	Likely to occur sometimes (has occurred frequently)	4
Remote	Unlikely to occur, but possible (has occurred rarely)	3
Improbable	Very unlikely to occur (not known to have occurred)	2
Extremely Improbable	Almost inconceivable that the event will occur	1

Table1: Safety Risk Probability

8.3 Safety Risk Severity

Once the probability assessment has been completed, the next step is to assess the safety risk severity, taking into account the potential consequences related to the hazard. Safety risk severity is defined as the extent of harm that might reasonably occur as a consequence or outcome of the identified hazard. The severity assessment can be based upon:

8.3.1 **Fatalities/injury:** - How many lives may be lost (employees, passengers, bystanders, and the general public)?

8.3.2 **Damage:** - What is the likely extent of aircraft, property or equipment damage?

The severity assessment should consider all possible consequences related to an unsafe condition or object, taking into account the worst foreseeable situation. Table 2 presents a typical safety risk severity table. It includes five categories to denote the level of severity, the description of each category, and the assignment of a value to each category. As with the safety risk probability table, this table is an example only.

SEVERITY	MEANING	VALUE
CATASTROPHIC	• Equipment destroyed • Multiple deaths	A
HAZARDOUS	• A large reduction in safety margins, physical distress or a workload such that the operators cannot be relied upon to perform their task accurately or completely. • Serious injury • Major equipment damage	B
MAJOR	• A significant reduction in safety margins, a reduction in the ability of the operators to cope with adverse operating conditions as a result of increase in workload, or as a result of conditions impairing their efficiency. • Serious incident • Injury to persons	C
MINOR	• Nuisance • Operating limitations • Use of emergency procedures • Minor incident	D
NEGLIGIBLE	• Little consequences	E

Table 2: Safety Risk Severity

8.4 Risk assessment

Risks are the potential adverse consequences of a hazard and are assessed in terms of their severity and probability. Thus, for each hazard resulting from the non-compliance, one can now describe the risk by placing the combination of severity and probability in the Risk assessment matrix table shown below. If the risk comes out as medium or above, risk reduction measures must be identified.

RISK PROBABILITY		RISK SEVERITY				
		Catastrophic A	Hazardous B	Major C	Minor D	Negligible E
Frequent	5	5A	5B	5C	5D	5E
Occasional	4	4A	4B	4C	4D	4E
Remote	3	3A	3B	3C	3D	3E
Improbable	2	2A	2B	2C	2D	2E
Extremely improbable	1	1A	1B	1C	1D	1E

Table 3: Risk Assessment Matrix Table

As can be seen from the risk classification matrix, risk reduction measures can aim towards either reducing the likelihood of an occurrence or reducing the probability of an occurrence.

The first priority should always be to seek measures that will reduce the likelihood of an occurrence (i.e. accident prevention). When contemplating mitigating measures, it is always necessary to look to the intent of the requirement that is not (fully) complied with.

8.5 Risk mitigation strategies may include:

8.5.1 revision of the system design;

8.5.2 modification of operational procedures;

8.5.3 changes to staffing arrangements;

8.5.4 training of personnel to deal with the hazard;

8.5.5 development of emergency and/or contingency arrangements and plans;

8.5.6 ultimately, ceasing operation.

8.6 Safety Risk Tolerability

The safety risk probability and severity assessment process can be used to derive a safety risk index. The index created through the methodology described above consists of an alphanumeric designator, indicating the combined results of the probability and severity assessments. The respective severity/probability combinations are presented in the safety risk assessment matrix in table 3.

The third step in the process is to determine safety risk tolerability. First, it is necessary to obtain the indices in the safety risk assessment matrix. For example, consider a situation where a safety risk probability has been assessed as occasional (4), and safety risk severity has been assessed as hazardous (B). The composite of probability and severity (48) is the safety risk index of the consequence.

The index obtained from the safety risk assessment matrix must then be exported to a safety risk tolerability matrix (Table 4) that describes the tolerability criteria for the particular organization. Using the example above, the criterion for safety risk assessed as 48 falls in the "unacceptable under the existing circumstances" category. In this case, the safety risk index of the consequence is unacceptable.

8.6.1 The organization must therefore:

a) Take measures to reduce the organization's exposure to the particular risk, i.e., reduce the likelihood component of the risk index;

b) Take measures to reduce the severity of consequences related to the hazard, i.e., reduce the severity component of the risk index; or

c) Cancel the operation if mitigation is not possible.

TOLERABILITY DESCRIPTION	ASSESSED RISK INDEX	SUGGESTED CRITERIA
Intolerable	5A, 5B, 5C 4A, 4B, 3A	Unacceptable in the existing circumstances.
Tolerable	5D, 5E, 4C, 4D, 4E, 3B, 3C, 3D, 2A, 2B, 2C	Acceptable based on risk mitigation. It may require Management decision.
Acceptable	3E, 2D, 2E, 1B, 1C, 1D, 1E	Acceptable

Table 4: Safety Risk Tolerability Matrix

8.7 Example of an Aeronautical Study Methodology

A generic model of an Aeronautical Study methodology consists of initiation, preliminary analysis, risk estimation, risk evaluation, risk control and action or monitoring.

8.7.1 **STEP 1:** Initiation

This step consists of defining the opportunity or problem and the associated risk issues; setting up the risk management team; and beginning to identify potential users who may be affected by any change.

8.7.2 **STEP 2:** Preliminary Analysis

The second step consists of defining the basic dimensions of the risk problem and undertaking an initial identification, analysis and evaluation of potential risks. This preliminary evaluation will help determine:

a) whether a situation exists that requires immediate action;
b) whether the matter requires further study prior to any action being taken; or,
c) whether the analysis should be ended as the risk problem is determined not to be an issue.

8.7.3 **STEP 3 and 4:** Risk Estimation

These steps estimate the degree of risk. Step 3 estimates the severity of the consequences and step 4 estimates the probability of their occurrence.

8.7.4 **STEP 5:** Risk Evaluation

The benefits and operational costs of the activity are integrated into the analysis and the risk is evaluated in terms of the safety implications of the activity and of the needs, issues, and concerns of affected users.

8.7.5 **STEP 6**: Risk Control

This step identifies feasible risk controls and mitigations which will act to reduce either the probability of the event or the consequence of the event should it occur.

8.7.6 **STEP 7:** Action or Monitoring

This step entails implementing the chosen risk control options, evaluating the effectiveness of the risk management decision process, and implementing an on-going monitoring program.

9. Acceptance by the SACAA

The Aeronautical Study and Risk assessment results need to be submitted to SACAA for the granting of exemptions.

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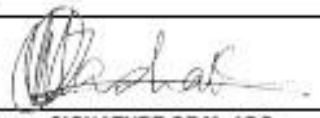	VICTRESS MASHAVA	11 JANUARY 2021
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	NELSON NKABITI	11 JANUARY 2021
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APPROVED BY:		
	GAWIE BESTBIER	11 JANUARY 2021
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6.4 ICAO Annex 14: Table 4-1

Table 4-1. Dimensions and slopes of obstacle limitation surfaces — Approach runways

APPROACH RUNWAYS

Surface and dimensions[a] (1)	RUNWAY CLASSIFICATION: Non-instrument Code number 1 (2)	Non-instrument Code number 2 (3)	Non-instrument Code number 3 (4)	Non-instrument Code number 4 (5)	Non-precision approach Code number 1,2 (6)	Non-precision approach Code number 3 (7)	Non-precision approach Code number 4 (8)	Precision approach category I Code number 1,2 (9)	Precision approach category I Code number 3,4 (10)	Precision approach category II or III Code number 3,4 (11)
CONICAL										
Slope	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Height	35 m	55 m	75 m	100 m	60 m	75 m	100 m	60 m	100 m	100 m
INNER HORIZONTAL										
Height	45 m	45 m	45 m	45 m	45 m	45 m	45 m	45 m	45 m	45 m
Radius	2 000 m	2 500 m	4 000 m	4 000 m	3 500 m	4 000 m	4 000 m	3 500 m	4 000 m	4 000 m
INNER APPROACH										
Width	—	—	—	—	—	—	—	90 m	120 m[e]	120 m[e]
Distance from threshold	—	—	—	—	—	—	—	60 m	60 m	60 m
Length	—	—	—	—	—	—	—	900 m	900 m	900 m
Slope								2.5%	2%	2%
APPROACH										
Length of inner edge	60 m	80 m	150 m	150 m	140 m	280 m	280 m	140 m	280 m	280 m
Distance from threshold	30 m	60 m	60 m	60 m	60 m	60 m	60 m	60 m	60 m	60 m
Divergence (each side)	10%	10%	10%	10%	15%	15%	15%	15%	15%	15%
First section										
Length	1 600 m	2 500 m	3 000 m	3 000 m	2 500 m	3 000 m	3 000 m	3 000 m	3 000 m	3 000 m
Slope	5%	4%	3.33%	2.5%	3.33%	2%	2%	2.5%	2%	2%
Second section										
Length	—	—	—	—	—	3 600 m[b]	3 600 m[b]	12 000 m	3 600 m[b]	3 600 m[b]
Slope	—	—	—	—	—	2.5%	2.5%	3%	2.5%	2.5%
Horizontal section										
Length	—	—	—	—	—	8 400 m[b]	8 400 m[b]	—	8 400 m[b]	8 400 m[b]
Total length	—	—	—	—	—	15 000 m	15 000 m	15 000 m	15 000 m	15 000 m
TRANSITIONAL										
Slope	20%	20%	14.3%	14.3%	20%	14.3%	14.3%	14.3%	14.3%	14.3%
INNER TRANSITIONAL										
Slope	—	—	—	—	—	—	—	40%	33.3%	33.3%
BALKED LANDING SURFACE										
Length of inner edge	—	—	—	—	—	—	—	90 m	120 m[e]	120 m[e]
Distance from threshold	—	—	—	—	—	—	—	c	1 800 m[d]	1 800 m[d]
Divergence (each side)	—	—	—	—	—	—	—	10%	10%	10%
Slope	—	—	—	—	—	—	—	4%	3.33%	3.33%

a. All dimensions are measured horizontally unless specified otherwise.
b. Variable length (see 4.2.9 or 4.2.17).
c. Distance to the end of strip.
d. Or end of runway whichever is less.
e. Where the code letter is F (Table 1-1), the width is increased to 140 m except for those aerodromes that accommodate a code letter F aeroplane equipped with digital avionics that provide steering commands to maintain an established track during the go-around manoeuvre.

Note.— See Circulars 301 and 345, and Chapter 4 of the PANS-Aerodromes, Part I (Doc 9981) for further information.

6.5 ICAO Annex 14: Table 4-2

Table 4-2. Dimensions and slopes of obstacle limitation surfaces

RUNWAYS MEANT FOR TAKE-OFF

Surface and dimensions[a] (1)	Code number 1 (2)	2 (3)	3 or 4 (4)
TAKE-OFF CLIMB			
Length of inner edge	60 m	80 m	180 m
Distance from runway end[b]	30 m	60 m	60 m
Divergence (each side)	10%	10%	12.5%
Final width	380 m	580 m	1 200 m 1 800 m[c]
Length	1 600 m	2 500 m	15 000 m
Slope	5%	4%	2%[d]

a. All dimensions are measured horizontally unless specified otherwise.
b. The take-off climb surface starts at the end of the clearway if the clearway length exceeds the specified distance.
c. 1 800 m when the intended track includes changes of heading greater than 15° for operations conducted in IMC, VMC by night.
d. See 4.2.24 and 4.2.26.

6.6 DFFE Protocol 320

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GAZETTED FOR IMPLEMENTATION

CIVIL AVIATION

PROTOCOL FOR THE SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS FOR ENVIRONMENTAL IMPACTS ON CIVIL AVIATION INSTALLATIONS

1. SCOPE

This protocol provides the criteria for the specialist assessment and minimum report content requirements for impacts on civil aviation installations for activities requiring environmental authorisation. This protocol replaces the requirements of Appendix 6 of the Environmental Impact Assessment Regulations[1].

The assessment and reporting requirements of this protocol are associated with the level of sensitivity identified by the national web based environmental screening tool (screening tool).

The screening tool can be accessed at: https://screening.environment.gov.za/screeningtool.

2. SITE SENSITIVITY VERIFICATION AND MINIMUM REPORT CONTENT REQUIREMENTS

Prior to commencing with a specialist assessment, the current use of the land and the potential environmental sensitivity of the site under consideration as identified by the screening tool must be confirmed by undertaking a **site sensitivity verification**.

2.1. The site sensitivity verification must be undertaken by an environmental assessment practitioner or specialist with expertise in radar.

2.2. The site sensitivity verification must be undertaken through the use of:
(a) a desk top analysis, using satellite imagery;
(b) a preliminary on-site inspection; and
(c) any other available and relevant information.

2.3. The outcome of the site sensitivity verification must be recorded in the form of a report that:
(a) confirms or disputes the current use of the land and environmental sensitivity as identified by the screening tool, such as new developments or infrastructure etc.;
(b) contains a motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity; and
(c) is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations.

3. SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS

TABLE 1: ASSESSMENT AND REPORTING OF IMPACTS ON CIVIL AVIATION INSTALLATIONS
1. General Information 1.1. An applicant intending to undertake an activity identified in the scope of this protocol for which a specialist assessment has been identified on the screening tool: 1.1.1. on a site identified as being of:

1.1.1.1. "very high", "high" or "medium" sensitivity for civil aviation, must submit a **Civil Aviation Compliance Statement;** or

1.1.1.2. "low" sensitivity, no further assessment requirements are identified.

1.1.2. on a site where the information gathered from the site sensitivity verification differs from the designation of "very high", "high" or "medium" sensitivity on the screening tool and it is found to be of a "low" sensitivity, no further assessment requirements are identified;

1.1.3. similarly, on a site where the information gathered from the initial site sensitivity verification differs from the designation of "low" sensitivity on the screening tool and it is found to be of a "very high", "high" or "medium" sensitivity, a **Civil Aviation Compliance Statement** must be submitted; and

1.1.4. If any part of the proposed development footprint falls within an area of "very high", "high" or "medium" sensitivity, the assessment and reporting requirements prescribed for the "very high", "high" and "medium" sensitivity apply to the entire footprint. In the context of this protocol, development footprint means the area on which the proposed development will take place and includes any area that will be disturbed.

VERY HIGH SENSITIVITY RATING - high likelihood for significant negative impacts on the civil aviation installation that cannot be mitigated. In-depth assessment of the potential impacts are likely to be required before development can be considered in these areas.	**2. Civil Aviation Compliance Statement**
HIGH SENSITIVITY RATING – potential for negative impacts on the civil aviation installation that can potentially be mitigated. Further assessment may be required to investigate potential impacts and mitigation measures.	2.1. The compliance statement must be prepared by an environmental assessment practitioner or a specialist with expertise in radar. 2.2. The compliance statement must: 2.2.1. be applicable to the preferred site and the proposed development footprint; 2.2.2. confirm the sensitivity rating for the site; and 2.2.3. indicate whether or not the proposed development will have an unacceptable impact on civil aviation installations. 2.3. The compliance statement must contain, as a minimum, the following information: 2.3.1. contact details of the environmental assessment practitioner or the specialist, their relevant qualifications and expertise in preparing the statement, and a curriculum vitae; 2.3.2. a signed statement of independence by the environmental assessment practitioner or specialist; 2.3.3. a map showing the proposed development footprint (including supporting infrastructure) overlaid on the civil aviation sensitivity map generated by the screening tool; 2.3.4. a comment, in writing, from the South African Civil Aviation Authority (SACAA), which may include inputs from the Obstacle Evaluation Committee (OEC), if appropriate, confirming no unacceptable impact on civil aviation installations; and 2.3.5. should the comment from the SACAA indicate the need for further assessment, a copy of the assessment report and mitigation measures is to be attached to the compliance statement and incorporated into the Basic Assessment Report or Environmental Impact Assessment Report with mitigation and monitoring measures identified included in the EMPr. The assessment must be in accordance with the requirements stipulated by the SACAA.
MEDIUM SENSITIVITY RATING - low potential for negative impacts on the civil aviation installation, and if there are impacts there is a high likelihood of mitigation. Further assessment of the potential impacts may not be required.	

	2.4. A signed copy of the compliance statement must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.
LOW SENSITIVITY RATING - No significant impacts on the civil aviation installation are expected in low sensitivity areas. It is unlikely for further assessment and mitigation measures to be required.	No requirement identified.

6.7 Resumes of Key Resources

Mr Basil Karstadt – PrCPM, BTech (SACPCMP). Basil is a professional project and construction manager who has specialized for nearly 30 years in the delivery of infrastructure projects, mainly for Public Sector clients in remote and developing areas. In aviation, from 2013 he led the KZN Provincial Treasury 'Crack Team' that was responsible for Provincial intervention in the municipal airport space and drove the KZN Regional Airport strategy, which ensured appropriate expenditure on upgraded infrastructure at many of KZN's municipal airports.

Mr Jon Heeger – Pr Eng, MBA, BSc (Eng). Formerly a property development manager in the RMB Group and Group Development Manager at ACSA from 1996, Jon has since become widely recognized as a leading 'regional airport' expert, specializing in turnaround strategies for former Municipal and GA airports. He also regularly acts as Guest Lecturer for the University of KZN and is active in the seminar and conference space as a host and moderator on a wide variety of airport development strategies and aviation topics.

Mr Sibusiso Nkabinde – PD (SA), Dip (BA), Air Traffic Control. Sibusiso is a seasoned professional with over 23 years experience in Air traffic Management, including Aeronautical Information Management, Aerodrome and Approach Air Traffic Control, Air Traffic Control Instruction & Examination, Air Traffic Services Management, Executive Leadership in Aeronautical Search & Rescue, Aerospace Medicine (ATC Ergonomics) and Governance. He is a full Professional Member of the Director's Association of South Africa and has notably represented South Africa in CANSO Task Teams, ICAO meetings, and South Atlantic ATM/CNS forums, focusing on Air Traffic Management System harmonization and interoperability.

Also refer: www.gwi.co.za | www.av-innovate.com

Curriculum Vitae (CV): JBC Heeger

1	PROPOSED POSITION FOR THIS PROJECT	*Aviation and Airport Specialist*			
2	NAME OF PERSON	*Heeger, Jon*			
3	DATE OF BIRTH	*2 May 1955*			
4	NATIONALITY	*South African*			
5	MEMBERSHIP IN PROFESSIONAL SOCIETIES	*Member, Engineering Council of South Africa -ECSA No. 820365 (1982 - 2008)*			
6	EDUCATION	*MBA (Construction Management), University of the Witwatersrand, 1985* *GDE (Construction Management), University of the Witwatersrand, 1985* *BSc. Civil Engineering, University of the Witwatersrand, 1977* *BCom modules (part time): Micro and Transport Economics, UNISA 1978-1980*			
7	OTHER TRAINING	*ACSA/IATA/ICAO- Internal Training & Development programmes (1994-2000)* *Presentor/Attendee at various Aviation Conferences/Seminars (Aviadev, ATNS, BARSA)* *Guest Lecturer for Aerotropolis Institute Africa, UKZN (202-2023)*			
8	LANGUAGES & DEGREE OF PROFICIENCY	Language	Speaking	Reading	Writing
		English	*Excellent*	*Excellent*	*Excellent*
		Afrikaans	*Good*	*Excellent*	*Good*
9	COUNTRIES OF WORK EXPERIENCE	South Africa, Botswana, Ghana, Mozambique, Nigeria, Liberia, China, Kenya, Brazil and Rwanda.			
10	EMPLOYMENT RECORD				

	Independent Expert/Consultant: Airport Planning and development	FROM: *2000*	TO: *2022*
	Airport Planning/Development Division - Airports Company South Africa Position: Group Manager – Airport developments	FROM: *1996*	TO: *1999*
	RMB Group (now Eris Properties) Position: General Manager: Developments	FROM: *1984*	TO: *1996*
	SA Transport Services Position: Civil Engineer – Rail Infrastructure	FROM: *1977*	TO: *1983*
11	WORK UNDERTAKEN THAT BEST ILLUSTRATES YOUR CAPABILITY TO HANDLE THIS ASSIGNMENT		
		2022/3 Airport/Aviation Specialist (ongoing) *Feasibility Study for a possible freight Aerotropolis in Sedibeng Municipality.* Passenger and freight demand assessment and catchment area determination; engagement with airline/charter operators and freight forwarders. Status quo review of existing airport infrastructure and compliance check with ICAO Annex 14, IATA and SACAA SARP's (safety, security, health and safety). Assessment of non-aeronautical revenue opportunities. Surface connectivity assessment and pre-planning for improved access onto Provincial roads system, based on Provincial Master Plans and IDP's. Identification of gaps and opportunities for innovation in airlift development, particularly RPAS (Remote Piloted Aircraft Systems, UAV's or drones) in commercial and law enforcement operations. Reference: Mr Tebogo Mutlaneng, Project Manager, Vaal Aerotropolis Study, Sedibeng District Municipality – **tebogom@sedibeng.gov.za**	
		2022/3 Airport/Aviation Specialist (ongoing) *Master and Land-use plan Review and Pre-Feasibility Study for the re-development of Plettenberg Bay Airport, Bitou Local Municipality.* Route analysis and passenger demand assessment; engagement with airline/GA operators. Status quo review of airport infrastructure and compliance check with ICAO Annex 14, IATA and SACAA SARP's (safety, security, health and safety). Diversification strategy for non-aeronautical revenue development. Surface connectivity assessment and pre-planning for new airport entrance and improved access onto Provincial roads system, including e-hailing options. Identification of gaps and opportunities for innovation in airlift development, particularly RPAS (Remote Piloted Aircraft Systems, UAV's or drones) in maritime patrol, commercial and law enforcement operations. Reference: Mr M Memani, Municipal Manager, Bitou Local Municipality – **mmemani@plett.gov.za**	

		2022 Airport/Aviation Specialist (ongoing) *Master and Land-use plan Review and Pre-Feasibility Study for the re-development of Margate Airport, Ray Nkonyeni Local Municipality.* Route analysis and freight/passenger demand assessment; engagement with airline/charter operators. Status quo review of airport infrastructure and compliance check with ICAO Annex 14, IATA and SACAA SARP's (safety, security, health and safety). Diversification strategy for non-aeronautical revenue development. Multi-modal connectivity assessment and pre-planning for new airport entrance and improved access onto Provincial road system, including public transport options. Identification of gaps and opportunities for innovation in airlift development, particularly RPAS (Remote Piloted Aircraft Systems, UAV's or drones) in maritime patrol and law enforcement operations. Reference: Ms Volanda van Rensburg, Airport Manager, Margate Airport, Ray Nkonyeni Local Municipality – **yolanda.vanrensburg@rnm.gov.za**
		2022 Aviation Specialist (ongoing) *Benchmarkinig Study and Strategy Development for Airlift as a Catalyst for Tourism Growth and Development in the SADC region. (SADC Ministers Council, Secretariat)* Route analysis and passenger surveys, route/frequency assessment with airline/charter operators. Assessment of scheduled and non-scheduled fleet mix and status quo review of airport infrastructure within the SADC region and compliance with ICAO Annex 14, IATA and client service levels standards/policies (security, health and safety). Review of Bilateral Air Service Agreements for International and Regional movements within SADC, identification of gaps and opportunities for innovation in airlift development. Status assessment of the progress of the SAATM initiative through the African Civil Aviation Commission and assessment of the status of the Yammousoukro Protocol. Reference: Dr Salifou Siddo, AFC Agriculture and Finance Consultants GmbH – **salifou.siddo@afci.de**
		2019/2022 Airport Specialist *Redevelopment Options for Malelane Airport, Malelane (Anglo American, SMEC Engineers)* Passenger surveys, traffic forecasting and route/frequency assessment with airline/charter operators. Assessment and agreement of critical design aircraft, runway and terminal planning to ICAO Annex 14, IATA and client service levels standards/policies (security, health and safety) for three site options; commercial land use options for airport precinct, Airport Master Plan including assessment of growth potential for aeronautical and

		commercial revenues. Assessment of airspace class and options development for navigational and ATC protocols. Input into EIA and noise footprint; Feasibility Study for integrated airport precinct and site options analysis. Reference: Mr B Strauss (Kumba) – 082 904 9300 **abraham.strauss@angloamerican.com**
		2019/2020: Airport Specialist *Pre-Feasibility Study for Proposed Ghana Airports Company Limited Regional Airport, Takoradi, Ghana.* Airport catchment area determination, traffic forecasting and route/frequency assessment. Engagement with GACL on Airport Master Plan and critical aircraft determination. Data gathering including meteorological/wind, runway length calculations and specification, obstacle limitation surface assessment, assessment of land use options for airport precinct, Airport Master plan including assessment of growth potential for aeronautical and JIT freight revenues. Terminal planning including peak hour assessment. Feasibility Study for integrated airport precinct.
		Airport Specialist and Business Analyst *Revitalization Options for Ulundi Airport, South Africa. Zululand District Municipality. (2017)* Land use options for airport precinct, update of the Airport Master plan including traffic analysis and assessment of growth potential for aeronautical and freight revenues. Feasibility Study for integrated airport precinct. Reference: Ms Thembi Hadebe - 082 902 6029
		Commercial/Airport Specialist *Precinct Planning of Port Elizabeth and East London Airports, ACSA (2018/2020)* Advise on commercial land use options for airport precinct, assessment of current traffic in relation to previous forecasts insofar as this may impact on commercial and cargo potential/growth. Assessment of other exogenous developments that may impact growth at both airports (e.g. Coega and ELIDZ). Reference: Mr L Tilana (ACSA)
		Airport Specialist and Business Analyst *Redevelopment Options for Grand Central Airport, Midrand. Ivora Capital, Old Mutual Properties (2018/9)* Land use options for airport precinct, update of the Airport Master plan including traffic analysis and assessment of growth potential for aeronautical and non-aeronautical revenues. Pre-Feasibility Study for integrated airport precinct and potential for use of drones for fast-moving commodity/freight delivery. Reference: Mr C Duminy - 083 633 6909

		Aviation Specialist *Republic of Kenya National Tourism Strategy (2017)* Analysis of existing route networks and traffic distribution and associated potential for international and domestic traffic/freight. Alignment of tourism priorities with airport and airlift strategies as between Ministry of Tourism, KAA, KCAA and stakeholder airlines including Kenya Airways, Fly540, Kenya Express and many non-scheduled operators. Assessment of likely impact of early adoption of SAATM on traffic within Kenya. Ref: Hon Najib Balala, Cabinet Secretary, Tourism
		Airport Specialist and Business Analyst (SMEC) *Richards Bay Airport Master Plan, South Africa. City of uMhlathuze (Richards Bay). (2009, 2017, 2021)* Site assessment, land use options and Airport Master plan including traffic forecast, critical aircraft determination and assessment of growth potential for aeronautical, freight and non-aeronautical revenues. Pre-Feasibility Study for new airport. Reference: Ms B Strachan – **strachanb@umhlathuze.gov.za**
		Airport Specialist and Business Analyst *Redevelopment Options for PC Pelser AIrport, Klerksdorp. Matlosana Municipality (2011,2017-19)* Land use options for airport precinct, update of the Airport Master plan including traffic analysis and assessment of growth potential for aeronautical and non-aeronautical revenues. Pre-Feasibility Study for integrated airport precinct. Reference: Mr A Khutlhwayo - 062 692 0590
		Aviation/Airport Specialist and Business Analyst *KZN Treasury Crack Team. KZN Treasury. (2012 – 2013).* Airport Master planning including traffic forecasts and assessment of growth potential for aeronautical and non-aeronautical revenues; Pietermaritzburg, Margate, Wonderboom National, Ladysmith, Ulundi and Richards Bay Airports. Reference: Mr F Alberts, ED Director, Wonderboom National Municipality – 082 802 0382
		Airport Specialist and Business Analyst *Proposed New Mkuze Airport. Umhlosinga Development Agency. (2008 to 2013).* Feasibility study for the Mkuze Regional Airport as a catalyst for socio-economic upliftment of the Umkhanyakude District, including potential for local airfreight of agricultural produce.
		Business/Aviation Specialist *Maun Airport Expansion. Botswana Civil Aviation Authority. (2005-2010).*

		Preparation and validation of traffic forecasts, developing a business model, scenario planning and economic cost-benefit analysis for period 2005-2030. Development of new terminal concept designs and detailed landside Master planning including parking areas and non-scheduled operator FBOs
		Consultant Team Leader *Development of new Passenger Terminals and Cargo Facilities at Maputo. Aeroporto du Mozambique. (2007-2012).* Design review and construction supervision consultant for the new Domestic and International Terminals at Maputo International Airport. Review of contractor-produced traffic forecast, design brief and design proposals, level-of-service analysis and value management. Reference: Mr A Tuendue, CEO, ADM
		Summary of other airport assignments pre 2007. (1980-2007). • *Team leader – Kruger Mpumalanga International Airport:* Commercialisation Study Proposal. • *Lead Joint Venture partner - Mafikeng Airport IDZ (NW Provincial Government):* Proposed Minerals Cluster and commercial development. • *Team leader – Ghana Civil Aviation Authority*: Accra and Kumasi International airport Master Plans; air platform and non-aeronautical commercialisation (proposal). • *Joint Venture consultant – Ghana Civil Aviation Authority:* Implementation of parking equipment and systems, Kotoka International Airport, Accra, Ghana. • *Transport Economist/Business Analyst – World Bank - Monrovia, Liberia:* Assessment of emergency works required at Roberts International Airport. Validation of traffic forecast, development of business model, scenario planning and economic cost-benefit analysis. • *Team Leader – Department of Civil Aviation, Gaborone, Botswana:* Design review and development of alternate designs for new passenger terminal, including development and validation of traffic forecasts and preparation of facilities/ architectural design brief. • *Aviation Specialist – Bi Courtney Consortium, Lagos, Nigeria: Preparation of Master Plan proposals for expansion of domestic terminal* ***As Client Development Team Leader*** • *International Terminal Retail Project – ORTIA Johannesburg (1997)* • *Design Team Leader – Domestic terminal ORTIA (1997)* • *4 300 bay Multi-storey parkade, ORTIA (1996)* • *Chairman, Airport Steering Committee, La Mercy Airport (1997)* • *General Aviation Centre, East London (1998)*

		• *Terminal upgrades, East London & Port Elizabeth (1998)* • *Refrigerated cargo facility, Cape Town (1997)* • *Precious Commodities handling facility, JIA (1997)* • *In-flight catering facility, Cape Town (1997)*

CERTIFICATION

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience. I understand that any wilful misstatement described herein may lead to my disqualification or dismissal, if engaged.

Date: 27/08/2023

[Signature of staff member or authorized representative of the staff]

Day/Month/Year

Full name of authorized representative: JONATHAN BARRY CLIVE HEEGER

1	PROPOSED POSITION FOR THIS PROJECT	*Air Traffic Management Specialis*
2	NAME OF PERSON	*Nkabinde, Sibusiso*
3	DATE OF BIRTH	*1 July 1981*
4	NATIONALITY	*South African*
5	MEMBERSHIP IN PROFESSIONAL SOCIETIES	*Professional Member, Director's Association of South Africa. No 2303/18. 2023 to current*
6	EDUCATION	*MBA, University of Witwatersrand, 2020 - current* *Diploma (Business Administration), Management College of South Africa, 2014* *Cert (Executive Management), University of La Verne, 2022*
7	OTHER TRAINING	*Introduction to Safety Management Systems for ATNS Operational Personnel, 2021* *Approach Control (Procedural and Radar) Rating, SACAA, 2012* *Approach Control (Procedural) Rating, SACAA, 2007* *Aerodrome Control Rating, SACAA, 2004* *PBN Implementation, ICAO, 2013* *Presenter/Attendee at various Aviation Conferences/Seminars/Committees (ATNS, ACSA,*

<table>
<tr><td></td><td></td><td colspan="4">SACAA, CANSO, ICAO, AFRAA, SASAR, OPSCOM, CARCOM)

Guest Lecturer on ATC Ergonomics in Aerospace Medicine, SACAA (2018 - current)</td></tr>
<tr><td rowspan="5">8</td><td rowspan="5">LANGUAGES & DEGREE OF PROFICIENCY</td><td>Language</td><td>Speaking</td><td>Reading</td><td>Writing</td></tr>
<tr><td>English</td><td>Excellent</td><td>Excellent</td><td>Excellent</td></tr>
<tr><td>Afrikaans</td><td>Fair</td><td>Fair</td><td>Fair</td></tr>
<tr><td>Zulu</td><td>Good</td><td>Good</td><td>Fair</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>9</td><td>COUNTRIES OF WORK EXPERIENCE</td><td colspan="4">South Africa</td></tr>
<tr><td rowspan="5">10</td><td>EMPLOYMENT RECORD</td><td colspan="4"></td></tr>
<tr><td>Manager: Air Traffic Services – OR Tambo International Airport, ATNS</td><td colspan="2">FROM:
2016</td><td colspan="2">TO:
2023</td></tr>
<tr><td>Head: Aeronautical Search and Rescue, South African Search and Rescue Organization (DoT)</td><td colspan="2">FROM:
2016</td><td colspan="2">TO:
2019</td></tr>
<tr><td>Manager Air Traffic Services – King Shaka International Airport, ATNS</td><td colspan="2">FROM:
2012</td><td colspan="2">TO:
2016</td></tr>
<tr><td>Air Traffic Controller, ATNS</td><td colspan="2">FROM:
2005</td><td colspan="2">TO:
2012</td></tr>
<tr><td>11</td><td>WORK UNDERTAKEN THAT BEST ILLUSTRATES YOUR CAPABILITY TO HANDLE THIS ASSIGNMENT</td><td colspan="4"></td></tr>
<tr><td></td><td></td><td colspan="4">2020/3 Project Manager

Air Traffic Management Operational Performance Dashboard at OR Tambo Air traffic Services Unit.

Dashboard Development: Lead the design, development, and implementation of an Air Traffic Management Operational Performance Dashboard for OR Tambo Air Traffic Services Unit. Collaborate with stakeholders to define key performance indicators (KPIs) and metrics for operational, safety, and administrative aspects of air traffic services.

Data Integration: Integrate data from various sources to create a unified and real-time view of operational performance. Ensure seamless integration of metrics related to safety, efficiency, and administrative processes for comprehensive reporting.

Metrics Analysis: Analyse performance metrics to identify trends, areas for improvement, and opportunities for optimization. Provide actionable insights to enhance operational efficiency, safety protocols, and administrative procedures.

Management Reporting: Develop regular and ad-hoc reports for management, presenting key findings and performance metrics. Collaborate with leadership to communicate complex data in a clear and concise manner.

Quality Assurance: Implement quality assurance processes to validate data accuracy and reliability within the Operational Performance Dashboard.</td></tr>
</table>

		Conduct regular audits to ensure the integrity of the performance metrics. Stakeholder Collaboration: Collaborate with air traffic controllers, safety officers, and administrative staff to gather relevant data and insights. Engage with management to understand their reporting needs and provide tailored solutions. Reference: Josia Manyakoana, COO - ATNS **josiam@atns.co.za**
		2012/233 Manager: Air Traffic Services *Air Traffic Service Unit Approval of Obstacles in Controlled Airspace* Obstacle Assessment: assessment of each obstacle applied for in terms of its height, location, and potential impact on air traffic operations, considering factors such as the obstacle's proximity to flight paths, airports, and navigation aids. Safety Standards and Regulations: Ensuring that the proposed obstacles comply with safety standards and regulations set by the aviation authorities including adherence to height restrictions, lighting requirements, and other safety measures aimed at preventing collisions. Risk Mitigation Strategies: Development and implementation of ATM strategies to mitigate risks posed by any existing obstacles. Documentation and Approval Process: Documenting the obstacle assessment process, including details of each obstacle, the corresponding risk assessment, and any mitigation strategies employed. Monitoring and Compliance: Following approvals, ensuring that implemented measures are consistently maintained, including the identification of any changes in the airspace environment that impacts on the Obstacle limitations. Communication with Air Traffic Controllers: Communicating obstacles to air traffic controllers, ensuring that they have up-to-date information about the controlled airspace. Reference: Josia Manyakoana, COO - ATNS **josiam@atns.co.za**
		2005/12 Air Traffic Controller *Aerodrome, Approach Procedural and Approach Radar Air Traffic Control.*

CERTIFICATION

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience. I understand that any wilful misstatement described herein may lead to my disqualification or dismissal, if engaged.

Date: 12/03/2024

[Signature of staff member or authorized representative of the staff]

Day/Month/Year

Full name of authorized representative: SIBUSISO WELCOME NKABINDE

6.8 Statement of Independence

DECLARATION BY THE SPECIALIST

I, Jonathan Barry Clive Heeger declare that –

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols") and in Government Notice No. 1150 of 30 October 2020.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing –
    - any decision to be taken with respect to the application by the competent authority; and;
    - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the NEMA Act.

Signature of the Specialist

GWI Aviation Advisory

Name of Company:

11 Mar 2024

Date

I, Sibusiso Welcome Nkabinde declare that –

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols") and in Government Notice No. 1150 of 30 October 2020.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing –
    - any decision to be taken with respect to the application by the competent authority; and;
    - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the NEMA Act.

Signature of the Specialist

GWI Aviation Advisory

Name of Company:

12 Mar 2024

Date

6.9 FAA Guidelines on EM Interference

For proposed projects off, but close to airport property, the methodology considers three key questions:

Does the project height penetrate airspace?

The FAA has certain criteria to determine this, but in the SA scenario we substitute ICAO Annex 14 and any additional provisions of the SACAA Regulations (CATS 139.30), where these are more onerous. This would typically involve a desktop analysis of the aerodrome or airfields closest to the project site – in this case only FAWB. Airfields further than 8km away are generally not affected, unless approach or departure corridors pass directly over the site and there are precision navigation approaches in play, where aircraft have very 'flat' approach paths of 2,0%. (There might be military considerations here, too, but these in fact are excluded from the provisions of the DFFE Protocol).

Is the Project Design/Orientation likely to cause reflectivity concerns?

For solar PV projects consideration is given to 'glint' and 'glare' issues that might cause 'flash blindness' arising from both specular and diffused reflections. This is important for solar PV projects, but for the other proposed facilities it may be necessary to consider any potential effects of construction materials (roof) and other potentially reflective components.

Depending on the proposed site layout, a geometric analysis based on the changing azimuth and bearing of the sun through the year, at key times during the day where air traffic is likely to be impacted, is sufficient for this purpose.

Is the Project likely to Interfere with Communications Systems, Operations and/or Flight Standards/Procedures?

The DFFE Protocol for environmental civil aviation studies refers specifically to 'radar'; however the FAA precedent document also looks at potential interference on all types of communications equipment, which is prudent. Thus, consideration is given to, inter alia:

Location of radar facilities

Location of Control Tower(s)

Location of (remaining) ground based NDB's (since these are being phased out)

Location of VOR/DME installations that could be affected by the potential of the project (or key components thereof) to generate EM radiation that could perhaps affect these. Based on FAA guidelines, these distances are generally quite small, and are not usually a cause for concern.

Finally, as part of the 'operational' aspect, a review would be undertaken of existing flight corridors, RNAV and VFR routes, approaches in the area and published airport/airfield procedures, circuits, etc., to assess the potential of the proposed project to negatively impact on any of these at a material risk level i.e. more severe than 'low'. If so – and only in such case – would the matter need to be escalated to the SACAA for further analysis or review, in terms of the DFFE Protocol.

6.10 ICAO Standards and Recommended Practices (SARPS)

All infrastructure proposals and developments will be implemented in accordance with standards and recommended practices of the International Civil Aviation Organisation (ICAO) and the SA Civil Aviation Authority (SACAA), as contained in the Civil Aviation Regulations (CARS), as well as relevant SANS standards, planning policies and by-laws in place in Tshwane.

Annex 14	Airport Planning
Annex 10	Aeronautical communications
Annex 17	Security
Doc 8991	Manual on Air Traffic Forecasting
Doc 8261	Airport Economics Manual

Table 6-1: Typical ICAO Annexes

Other stakeholders in the civil aviation space may need be consulted including the SACAA and ATNS.

Airport Reference Code

Airport geometrics are determined in accordance with International Standards and Recommended practices (SARPS). These standards are included in the following documents (as updated by ICAO from time to time):

- ICAO, Annex 14 “International Standards and Recommended Practices for Airports”;
- ICAO, Airport Design Manual part 1: Runways;
- ICAO, Airport Design Manual part 2: Taxiways, Aprons and Holding Bays;
- ICAO, Airport Design Manual part 3: Pavements;
- ICAO, Airport Design Manual part 4: Visual Aids;
- ICAO, Airport Design manual part 5: Electrical Systems;
- ICAO, Airport Design Manual part 6: Frangibility;
- ICAO, Airport Services Manual, part 1: Rescue and Fire Fighting;
- ICAO, Airport Services Manual, part 3: Bird Control and Reduction;
- ICAO, Airport Services Manual, part 6: Control of Obstacles;

ICAO Annex 14 assigns an Airport Reference Code (Code number and letter), which is a simple method for matching the characteristics of airport facilities to those of aircraft intended to operate at the airport. The code number is used to classify the runway length, referenced to sea level under ‘standard’ atmospheric conditions; the code letter is used to classify the main part of the airside layout, based mainly on aircraft wingspan, although more recent editions also use landing gear geometry as a reference.

CODE ELEMENT 1		CODE ELEMENT 2	
Code number	**Aeroplane Reference Field Length**	**Code Letter**	**Wing span**
1	Less than 800	**A**	Up to but not including 15m
2	800m up to but not including 1200m	**B**	15m up to but not including 24m
3	1200m up to but not including 1800m	**C**	24m up to but not including 36m

4	1800m and over	**D**	36m up to but not including 52m
		E	52m up to but not including 65m