

EMPr

Environmental Management Programme: God's Window Skywalk Project

(Annexure G of Basic Assessment
Report)

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Mapulana Canyon (Pty) Ltd

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TABLE OF CONTENTS

| | | |
|-------|--|----|
| 1 | OVERVIEW..... | 8 |
| 1.1 | PURPOSE OF THIS EMPR..... | 8 |
| 1.2 | LEGAL REQUIREMENTS FOR AN EMPR..... | 8 |
| 1.2.1 | General requirements for EMPs..... | 8 |
| 1.3 | EXPERTISE OF ENVIRONMENTAL ASSESSMENT PRACTITIONER..... | 10 |
| 1.4 | PROJECT PHASING..... | 10 |
| 1.4.1 | Planning and Design Phase..... | 10 |
| 1.4.2 | Pre-Construction Phase/Activities..... | 11 |
| 1.4.3 | Construction Phase..... | 11 |
| 1.4.4 | Operational Phase..... | 11 |
| 1.4.5 | Closure and Decommissioning Phase..... | 11 |
| 2 | BACKGROUND INFORMATION..... | 12 |
| 2.1 | PROJECT DESCRIPTION..... | 12 |
| 2.2 | PROJECT LOCALITY..... | 15 |
| 2.3 | LEGAL FRAMEWORK..... | 17 |
| 2.3.1 | Relevant Legislation..... | 17 |
| 2.3.2 | Listed Activities in terms of NEMA..... | 20 |
| 3 | ROLES AND RESPONSIBILITIES..... | 24 |
| 3.1 | CONTRACTOR..... | 24 |
| 3.2 | DEVELOPER..... | 24 |
| 3.3 | SITE ENGINEER (SE)..... | 24 |
| 3.4 | ENVIRONMENTAL CONTROL OFFICER (ECO)..... | 24 |
| 3.4.1 | Environmental Induction/Awareness Training..... | 25 |
| 3.4.2 | Permits and Authorisations..... | 25 |
| 3.5 | ENVIRONMENTAL SITE AGENT (ESA)..... | 26 |
| 3.6 | ENVIRONMENTAL AUTHORITY..... | 26 |
| 3.7 | WORKING AREA..... | 26 |
| 4 | ENVIRONMENTAL IMPACTS AND MITIGATION..... | 27 |
| 4.1 | BIODIVERSITY..... | 28 |
| 4.1.1 | Fauna Assessment..... | 28 |
| 4.1.2 | Floral Assessment and Plant Species Assessment..... | 30 |
| 4.1.3 | Freshwater Aquatic, Wetland and Riparian Assessment..... | 41 |
| 4.1.4 | Hydropedology Assessment..... | 45 |
| 4.2 | INITIAL OBSTACLE LIMITATION SURFACE (OLS) ASSESSMENT..... | 46 |
| 4.3 | AGRICULTURAL STATEMENT..... | 46 |
| 4.4 | ARCHAEOLOGICAL AND HERITAGE IMPACT ASSESSMENT..... | 46 |
| 4.5 | TRAFFIC IMPACT ASSESSMENT..... | 47 |
| 4.6 | LANDSCAPE AND VISUAL IMPACT ASSESSMENT..... | 47 |
| 4.6.1 | Mitigation -Pre-construction..... | 48 |
| 4.6.2 | Mitigation - Construction and operation..... | 48 |
| 4.7 | SOCIAL IMPACT ASSESSMENT..... | 48 |
| 5 | SUMMARY OF IMPACTS AND ASSOCIATED MITIGATION MEASURES..... | 57 |
| 6 | PRE-CONSTRUCTION AND CONSTRUCTION SITE ENVIRONMENTAL MANAGEMENT..... | 58 |
| 7 | MATERIALS..... | 65 |
| 8 | WASTE..... | 69 |
| 9 | SURROUNDING PROPERTIES..... | 72 |
| 10 | FAUNA, FLORA, AIR QUALITY, NOISE, WATER AND OTHER ENVIRONMENTAL ASPECTS | 73 |
| 11 | REHABILITATION..... | 78 |
| 12 | PLANNING AND ENGINEERING CONSIDERATIONS..... | 79 |
| 13 | NON-COMPLIANCE AND PENALTIES..... | 80 |

| | | |
|------|---|----|
| 14 | OPERATIONAL PHASE..... | 81 |
| 14.1 | ALIEN AND INVASIVE PLANT MANAGEMENT PLAN..... | 81 |
| 14.2 | EROSION CONTROL..... | 81 |
| 14.3 | WASTE MANAGEMENT..... | 81 |
| 15 | DECOMMISSIONING..... | 82 |
| 16 | CONCLUSION..... | 83 |
| 5. | REFERENCES..... | 84 |

APPENDICES

APPENDIX A: EAP DETAILS

APPENDIX B: FOSSIL CHANCE FIND PROTOCOL

APPENDIX C: LOCALITY MAP

Figures

FIGURE 1: TOURIST FACILITY LAYOUT (VISITOR'S CENTRE, SKYWALK, SKYBRIDGE AND PARKING AREA)

FIGURE 2: LOCALITY MAP (ZUTARI,2022)

Tables

| | | |
|-----------|--|----|
| TABLE 1 | REQUIREMENTS OF AN EMPR AS DETAILED IN APPENDIX 4 OF THE NEMA EIA REGULATIONS 2014 (AS AMENDED)..... | 6 |
| TABLE 2: | REQUIREMENTS OF AN EMPR ACCORDING TO SECTION 24N (2) AND (3) OF THE NEMA..... | 9 |
| TABLE 3: | TOURIST FACILITY..... | 12 |
| TABLE 4: | RELEVANT LEGISLATION AND THE APPLICABILITY THEREOF..... | 17 |
| TABLE 5: | LISTED ACTIVITIES TRIGGERED BY THE PROPOSED TOURIST FACILITY..... | 20 |
| TABLE 6: | SUMMARY OF SOCIAL IMPACTS AND RECOMMENDED MITIGATION MEASURES..... | 50 |
| TABLE 7: | PRE-CONSTRUCTION AND CONSTRUCTION SITE ENVIRONMENTAL MANAGEMENT..... | 58 |
| TABLE 8: | HANDLING MATERIALS..... | 65 |
| TABLE 9: | HANDLING WASTE..... | 69 |
| TABLE 10: | SURROUNDING PROPERTIES..... | 72 |
| TABLE 11: | FLORA, FAUNA, AIR QUALITY, NOISE, WATER AND OTHER..... | 73 |
| TABLE 12: | REHABILITATION..... | 78 |
| TABLE 13: | PLANNING AND ENGINEERING CONSIDERATIONS..... | 79 |

List of Abbreviations and Acronyms

| Acronym | Abbreviation |
|-------------------|--|
| ATNS | Air Traffic Navigation Services |
| BA | Basic Assessment |
| BAR | Basic Assessment Report |
| CA | Competent Authority |
| CAA | Civil Aviation Authorities |
| CARA | Conservation of Agricultural Resources Act (Act NO. 43 Of 1983) |
| CPA | Communal Property Association |
| CBA | Critical Biodiversity Areas |
| CSTPP | Containerised Sewer Treatment Package Plant |
| DEA | Department of Environmental Affairs |
| DARDLEA | Mpumalanga Department of Agriculture, Rural Development, Land Reform and Environmental Affairs |
| DEA&DP | Department of Environmental Affairs and Development Planning (Western Cape) |
| DENC | Department of Environment and Nature Conservation |
| DM | District Municipality |
| DFFE | Department of Fisheries, Forestry and Environment |
| DoE | Department of Energy |
| EA | Environmental Authorisation |
| EAP | Environmental Assessment Practitioner |
| ECA | Environment Conservation Act, 1989 (Act No. 73 of 1989) |
| ECO | Environmental Control Officer |
| EIA | Environmental Impact Assessment |
| EMPr | Environmental Management Programme |
| FAQ | Frequently Asked Question |
| I&AP | Interested and Affected Party |
| IBA | Important Bird Area |
| MNCA | Mpumalanga Nature Conservation Act (Act NO. 10 Of 19998) |
| NFEPA | National Freshwater Ecosystems Priority Areas |
| NEMA | National Environmental Management Act (Act No 107 of 1998) |
| NEM:BA | National Environmental Management: Biodiversity Act (Act No. 10 of 2004) |
| NFA | National Forests Act (Act No. 84 of 1998) |
| NHRA | National Heritage Resources Act (Act No 25 of 1999) |
| NEM:PAA | National Environmental Management: Protected Areas Act (Act No. 57 of 2003) |
| NEM:WA | National Environmental Management: Waste Act (Act No. 59 of 2008) |
| NWA | National Water Act (Act No. 36 of 1998) |
| PPP | Public Private Partnership Agreement |
| OLS | Obstacle Limitation Surface |
| SANBI | South African National Biodiversity Institute |
| SABAP | Atlas of Southern African Birds |
| SuDS | Sustainable Drainage Systems |
| SCC | Species of conservation concern |
| SDF | Spatial Development Framework |
| SIA | Social Impact Assessment |
| TCLM | Thaba Chweu Local Municipality |
| VAC | Visual Absorption Capacity |
| WUL | Water Use Licence |
| WULA | Water Use Licence Application |
| WSUD | Water Sensitive Urban Design |

Requirements of Environmental Management Programmes

Appendix 4 of the National Environmental Management Act (Act No 107 of 1998) (NEMA) Environmental Impact Assessment (EIA) Regulations 2014 (as amended) specifies the requirements of an Environmental Management Programme (EMPr). The table below serves as a map of how the requirements detailed in Appendix 4 have been adhered to.

Table 1 Requirements of an EMPr as detailed in Appendix 4 of the NEMA EIA Regulations 2014 (as amended).

| Requirement | Reference |
|--|---|
| Details of the EAP who prepared the EMPr and the expertise of the EAP, including a CV. | Appendix A |
| A protocol outlining procedures to be followed in the event that a heritage resource is uncovered during the project development. | Appendix B |
| A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description. | Section 1 and Section 2 |
| A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers. | Appendix C for Locality Map. |
| A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including: <ul style="list-style-type: none"> ▶ Planning and design; ▶ Pre-construction activities; ▶ Construction activities; and ▶ Rehabilitation of the environment after construction where applicable and post closure where relevant. | Section 4 to Section 12 and Section 14 |
| A description of proposed impact management actions, identifying the manner in which the impact management outcomes will be achieved, and must, where applicable, include actions to: <ul style="list-style-type: none"> ▶ Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; ▶ Comply with any prescribed environmental management standards or practices; ▶ Comply with any applicable provisions of the legislation regarding closure, where applicable; and ▶ Comply with any provisions of the legislation regarding financial provision for rehabilitation, where applicable. | Section 4 to Section 12 and Section 14 |
| The method of monitoring the implementation of the impact management actions. | Section 3.4 and Section 5 to Section 12 |
| The frequency of monitoring the implementation of the impact management actions. | Section 3.4 and Section 5 to Section 12 |
| An indication of the persons who will be responsible for the implementation of the impact management actions. | Section 3 and Section 5 to Section 12 |
| The time periods within which the impact management actions must be implemented. | Section 5 to Section 12 |

| | |
|--|---|
| The mechanism for monitoring compliance with the impact management actions. | Section 3.4 and Section 5 to Section 12 |
| A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations. | Section 3.4 and Section 5 to Section 12 |
| An environmental awareness plan describing the manner in which: <ul style="list-style-type: none"> (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment. | Section 3.4 and Section 5 to Section 12 |
| Any specific information that may be required by the Competent Authority (CA). | None to date. |

1 Overview

This chapter provides a general overview of this Environmental Management Programme (EMPr) and a summary of the purpose of the document and its structure. Relevant legislation pertaining to this document is also briefly discussed.

1.1 Purpose of this EMPr

The purpose of this EMPr is to provide environmental management practices and recommendations to ensure that the impacts associated with the proposed God's Window Skywalk Project and related Infrastructure are avoided where it is feasible, managed, mitigated, and kept to an acceptable level. In this case acceptable level would mean adhering to a prescribed tool(s), strategy, procedure(s) or method(s) designed to reduce the impact significance and mitigate adverse environmental impacts. The recommendations included herein are applicable to the following stages of the proposed development:

- ▶ Planning and design;
- ▶ Pre-construction and construction;
- ▶ Operation; and
- ▶ Closure and decommissioning.

This EMPr aims for alignment and optimisation of environmental management processes with the conditions of Environmental Authorisation (EA) that may arise. Any conditions of authorisation contained in the EA that contradict the recommendations made in this EMPr, will supersede the recommendations of this document. The EMPr must be updated to address conditions of the EA that are relevant to environmental management (should this be a condition of authorisation).

A hard copy of the EMPr must always be in the site office and made available to government officials upon request.

1.2 Legal Requirements for an EMPr

1.2.1 General requirements for EMPrs

The content of EMPrs must meet the requirements in Section 24N (2) and (3) of NEMA and Appendix 4 of the NEMA EIA Regulations 2014 (as amended). Appendix 4 specifies the required contents of an EMPr.

The Department of Environmental Affairs & Development Planning (DEA&DP)'s¹ *Guideline for Environmental Management Plans* (2005) aims to inform and guide the preparation and implementation of EMPrs. The conditions of the guideline and requirements specified in Appendix 4 of the EIA Regulations 2014 (as amended) (**Error! Reference source not found.** above) have been considered in compiling this document. The DEA&DP guideline defines an EMPr as:

“an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the project are enhanced”

The EMPr must address the potential environmental impacts of the proposed activity on the environment throughout the project life cycle, including an assessment of the effectiveness of monitoring and management arrangements after implementation. EMPrs must be submitted together with the Environmental Impact Assessment Report so that they can be considered simultaneously.

¹ The DEA&DP's guideline is used even though the proposed project is based in the Mpumalanga Province, as there is no national EMPr guideline.

Section 24N (2) and (3) of the NEMA lists the requirements of an EMPr, these are presented in Table 2 below.

Table 2: Requirements of an EMPr according to Section 24N (2) and (3) of the NEMA

| |
|--|
| <p>24N.(2) <i>the environmental management programme must contain-</i></p> <p>(a) <i>information on any proposed management, mitigation, protection or remedial measures that will be undertaken to address the environmental impacts that have been identified in a report contemplated in subsection 24(1A), including environmental impacts or objectives in respect of –</i></p> <p style="padding-left: 40px;">(i) <i>planning and design;</i></p> <p style="padding-left: 40px;">(ii) <i>pre-construction and construction activities;</i></p> <p style="padding-left: 40px;">(iii) <i>the operation or undertaking of the activity in question; the rehabilitation of the environment; and closure, where relevant.</i></p> <p>(b) <i>details of –</i></p> <p style="padding-left: 40px;">(i) <i>the person who prepared the environmental management programme; and</i></p> <p style="padding-left: 40px;">(ii) <i>the expertise of that person to prepare an environmental management programme</i></p> <p>(c) <i>a detailed description of the aspects of the activity that are covered by the draft environmental management plan;</i></p> <p>(d) <i>information identifying the persons who will be responsible for the implementation of the measures contemplated in paragraph (a);</i></p> <p>(e) <i>information in respect of the mechanisms proposed for monitoring compliance with the environmental management programme and for reporting on the compliance.</i></p> <p>(f) <i>as far as is reasonable practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and</i></p> <p>(g) <i>a description of the manner in which it intends to-</i></p> <p style="padding-left: 40px;">(i) <i>modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;</i></p> <p style="padding-left: 40px;">(ii) <i>remedy the cause of pollution or degradation and mitigation of pollutants; and</i></p> <p style="padding-left: 40px;">(iii) <i>comply with any prescribed environmental management standards or practices.</i></p> <p>(3) <i>the environmental management programme must, where appropriate-</i></p> <p>(a) <i>set out time periods within which the measures contemplated in the environmental management programme must be implemented;</i></p> <p>(b) <i>contain measures regulating responsibilities for any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of prospecting or mining operations or related mining activities which may occur inside and outside the boundaries of the prospecting area or mining area in question; and</i></p> <p>(c) <i>develop an environmental awareness plan describing the manner in which-</i></p> <p style="padding-left: 40px;">(i) <i>the applicant intends to inform his or her employees of any environmental risk which may result from their work; and</i></p> <p style="padding-left: 40px;">(ii) <i>risks must be dealt with in order to avoid pollution or the degradation of the environment.</i></p> |
|--|

This EMPr addressed the above-mentioned legal requirements in Table 2 above, while also aiming to meet the requirements of the DEA&DP guideline document for Environmental Management Plans².

This document should be seen in an iterative context, allowing for amendments throughout the life cycle of the project and adjustments as new information is made available, unforeseen situations arise or as conditions warrant adaptation.

² Lochner, P. 2005. *Guideline for Environmental Management Plans*. CSIR Report No ENV-S-C 2005-053 H. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

1.3 Expertise of Environmental Assessment Practitioner

Section 33 of EIA Regulations and Section 24N (2) and (3) of the NEMA requires that an EMPr must include the details of the person(s) who prepared the EMPr, and the expertise of that person to prepare an EMPr. Zutari has selected a team of highly experienced specialists and multi-disciplinary practitioners to execute this project in a professional and unbiased manner. A synopsis of the qualifications and experience of Zutari's environmental assessment team for this project is provided hereunder. Full Curriculum Vitae (CVs) are available in Appendix A.

The Lead Environmental Assessment Practitioner (EAP), **Mrs. Natanya Whitehorn** is an environmental practitioner at Zutari as well as a Registered EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA) for this project. She specialises in environmental auditing and her expertise consists of risk assessment, environmental monitoring and social impact assessments (SIAs), including the study of human interaction with one another and the natural environment. She has experience in fieldwork for impact assessments, environmental monitoring as well as the public participation process, where, she has assisted and translated at various landowner, stakeholder and public meetings and also gained experience in environmental compliance monitoring by working on a large construction project.

Further significant experience includes integrated environmental management (IEM) processes such as environmental impact assessments (EIAs), basic assessment reports (BARs) and the development of environmental management plans (EMPs). She has previous working experience in geo-informatics and geographic information systems (GIS). She has more than a decade of experience working with GIS, which she has gained whilst working on projects for the government, local authorities as well as the private sector. She has also gained skills in spatial representation and interpretation through her involvement in the engineering environment.

Natanya has specialised in spatial analysis, data processing and mapping while her technical responsibilities include inter alia the evaluation of data, digitising, editing and converting spatial data and non-spatial data from various formats and manipulating data in Esri ArcMap with extension (XTools, ET Geowizards, ET Geotools), ArcView 3.2 and Planet GIS. She has research experience on biodiversity, natural resources management, and human developmental issues and tutoring experience at a tertiary institution in the field of Information Science (IS).

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

The assistant EAP, **Mrs. Candice Dürr**, has over eight years' of environmental science-related experience and has a Bachelor of Science degree in Environmental and Biological Sciences and an Honours degree in Environmental Management.

1.4 Project Phasing

1.4.1 Planning and Design Phase

This phase includes applications for environmental, town planning and other relevant authorisations. The planning and design phase investigate the possible impact of the proposed development on the receiving environment and recommend mitigation measures. This phase would have been concluded once the contractor views this document.

1.4.2 Pre-Construction Phase/Activities

The pre-construction phase includes activities such as appointment of an Environmental Control Officer (ECO), pre-construction environmental workshop/induction training (conducted by the ECO), site demarcation, establishment of a site camp, demarcation of areas such as fuel storage and plant and animal rescue. Specifications for these activities are included in this EMPr. This phase also includes the application processes to obtain permits for e.g., permits required to remove any protected tree(s) or plant/animal species of conservation concern.

1.4.3 Construction Phase

The construction phase commences with earthworks and all activities relating to the construction of the proposed tourist facility e.g., installation of services, construction of the visitor's centre, water storage structures, parking area, skywalk and skybridge as well as associated auxiliary infrastructure.

1.4.4 Operational Phase

The operational phase commences when the proposed development is being used for its intended purpose i.e., tourist destination. It is possible that there will be a period in the project life cycle where the construction and operational phase will overlap. This phase will include ongoing operation, monitoring, and maintenance of the tourist facility, and continuing environmental management requirements (e.g., removal of alien and invasive plant species).

1.4.5 Closure and Decommissioning Phase

The decommissioning phase refers to the discontinuation of the tourist facility and removal of all associated infrastructure. This would entail dismantling the tourist centre, parking area, skywalk, skybridge and all associated infrastructure. Rehabilitation of the site to a suitable end use would also form part of the decommissioning phase leading to closure. It is highly unlikely that the facility would be demolished and return the site to pre-construction conditions. The intention is to continue with the project for as long as the developed project is sustainable.

A Closure Plan is not applicable to this project as it is not anticipated that the proposed project will be closed. In case that there is a need to close the development, a closure plan should be developed at the time of closure. This would likely take place prior to the closure of the entire development footprint, comprising of all infrastructure. In the event that closure is required, all the relevant authorisations relating to closure should be granted before the closure activities commences.

2 BACKGROUND INFORMATION

Mapulana Canyon (Pty) Ltd (hereafter referred to as Mapulana Canyon), in partnership with the Mpumalanga Tourism and Parks Agency (MTPA) via a Public Private Partnership Agreement (PPP) proposes the development of a new tourist facility at the existing God's Window site. A business ownership model for the project has been developed and a PPP has been formed with Motsamayi Tourism Group (Pty) Ltd and four Community Property Associations (CPAs). Motsamayi Tourism Group (Pty) Ltd and the CPAs created a Special Purpose Vehicle (SPV), being Mapulana Canyon (Pty) Ltd, which was appointed to invest, design, build, operate, and manage the project.

Zutari (Pty) Ltd (hereafter referred to as Zutari) was appointed by Mapulana Canyon as the independent EAP to manage the new application for an EA and Water Use License (WUL) for this project. The proposed project requires an EA in terms of the National Environmental Management Act (Act No 107 of 1998) (NEMA) and its EIA Regulations (2014 as amended in 2017) as well as a Water Use Licence in terms of the National Water Act, Act No. 36 of 1998 (NWA).

2.1 Project description

The proposed project entails the total refurbishment, development, and expansion of the existing infrastructure at God's Window. With the project footprint of approximately 25 000 m² in size, consisting of a lower and upper level. The project would entail the development of a new tourist attraction hub comprising of the skywalk, skybridge, tourist attraction centre and related infrastructure. God's Window is located within the Panorama Route, providing a panoramic view of the lowveld more than 900 metres down into the forest of the Blyde River Canyon. The skywalk will be a cantilevered glass walkway suspended off the edge of the cliff to give visitors a 360-degree panoramic view. The walkway will protrude about 30 metres out from the cliff and will be approximately 5 metres wide. Whereas the skybridge will consist of a series of steel frames carrying a timber and glass walkway with the entire structure being anchored by the cliff face.

The tourism facility is expected to include the following infrastructure and human-centric experiences. Note that these tourism attractions are conceptual and dependent on the final design of the development.

Table 3: Tourist Facility

| |
|---|
| Infrastructure/experience |
| Skywalk |
| Skybridge |
| Skynests |
| Skyswing |
| Visitors' Centre to include: |
| Proposed possible Zero Gravity Room (to be finalised during detail design) |
| Museum |
| Craft Market |
| Cultural Performance |
| Guided Tours |
| Virtual Experiences |
| Restaurants |
| Administration offices |
| Ablutions |

| |
|--|
| Meeting Rooms |
| Supporting Infrastructure |
| Gate house |
| Parking Area |
| Stormwater Attenuation Pond |
| Services |
| Sewage Treatment Package Plant (STPP) |
| Water Storage Tank |

The list above is not exhaustive but highlights the main attractions, spaces and infrastructure that are proposed for the tourism facility. The facility will also include technical spaces such as IT server rooms, electrical rooms, and wet services supporting the tourist facility.

Figure 2-1 illustrates the development layout of various elements forming the tourist facility.



Figure 2-1: Tourist facility layout (visitor's centre, skywalk, skybridge and parking area)

2.2 Project Locality

The God's Window Skywalk Project will be situated on the farms De Houtbosch 503 KT and Potion 2 of the farm Lisbon 531 KT, within the jurisdiction of Thaba Chweu Local Municipality, in the broader Ehlanzeni District Municipality in the Mpumalanga Province (refer to Figure 2-2). These properties are owned by the National Government of the Republic of South Africa and the Provincial Government of Mpumalanga, respectively.

The project site is located on the rim of the Mpumalanga Escarpment, along the Panorama Route in the Blyde River Canyon Nature Reserve, located in the Mpumalanga Province in the north-eastern part of South Africa. The site is situated approximately 95km north of Mbombela which is the largest city in the area. The project site lies 5km north of Graskop, which together with Sabie and Hazyview, forms a triangle of key tourism towns along a scenic route. Access to site can be achieved via the provincial road R533 travelling towards the north, thereafter, joining R532 at Graskop and linking to R534 towards the northeast. God's Window would be approximately 7km from joining the R534.

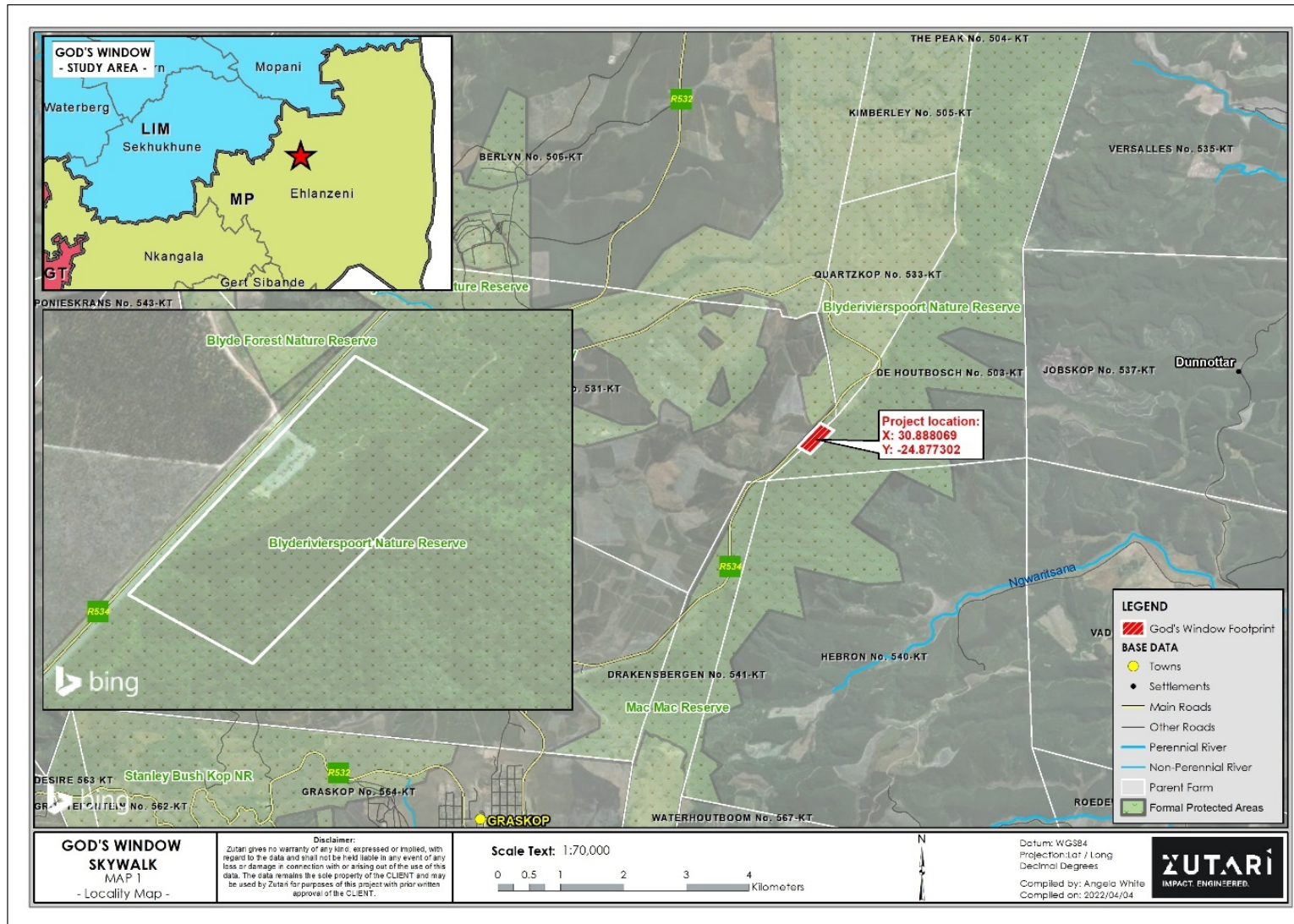


Figure 2-2: Locality Map

2.3 Legal Framework

Legal and policy requirements applicable to the project are discussed in the sections below.

2.3.1 Relevant Legislation

An overview of the relevant legislation is provided below in Table 4.

Table 4: Relevant legislation and the applicability thereof

| Act | Regulations | Summary of requirements |
|---|--|--|
| National Water Act (Act No. 36 of 1998) (NWA) | GN R 267 of 2017: Regulations for Water Use License procedures GN R 509 of 2016: General Authorisation in terms of Section 39 of the National Water Act, 1998 for Water Uses as defined in Section 21(c) and 21(i) GN R 36 of 1998: Part 3: Existing lawful water uses | The NWA is intended to provide for the equitable use of water in South Africa, to prevent the pollution of water and to protect the rights of people and the environment to water. Section 21 of the NWA prescribes that water users must obtain Water Use Licenses (WULs) prior to making any changes to watercourses and for various other activities deemed to be "Water Uses". These may be in the forms of General Authorisations (GAs) or full WULs. Part 3 defines the existing lawful water use and the process to verify the existing water use. |
| National Environmental Management Act (Act No. 107 of 1998) (NEMA) | 2010 EIA Regulations: Government Notice (GN) R 543 to 546 of 2010 2014 EIA Regulations: Government Notice (GN) R 982 to 984 of 2014 | In terms of the EIA Regulations certain types of projects and their associated activities require EA prior to the commencement of construction of the proposed project. Listed activities require the undertaking of a Basic Assessment (BA) process or a Scoping and EIA process to obtain EA. The procedural and reporting requirements for both the BA and Scoping / EIA are set out in the EIA Regulations. Three versions of these Regulations have been gazetted under the NEMA since 2006, with the 2014 version being the latest. The project commenced under the 2010 Regulations (GN No. R544 and R546 (those requiring a BA process). Although the project only triggered the need for a BA process, the implementation of an on-site wastewater treatment plant the project initially required a WML by means of a Scoping & EIA process. The application was therefore upgraded (prior to the requirement for a WML being repealed) in order to provide for a comprehensive assessment of the impacts associated with the project. The purpose of the impact assessment process is to identify, assess and report on any potential impacts the proposed project may have on the receiving environment, if implemented. The impact assessment report also needs to describe how impacts on the biophysical and socio-economic environment can be, as far as possible, enhanced or mitigated and managed as the case may be. Impact assessment reports and supporting documents are submitted to the Competent Authority (CA), which may be a provincial or national department of environment who need to decide whether to grant or refuse an application for EA. |
| | Application form for the regularisation of unlawful commencement or continuation of a listed activity or waste management activity in terms of section 24G of the National Environmental | Unauthorised commencement or continuation of activities identified in terms of the EIA Regulations can be rectified by means of an application to the Minister or relevant MEC by means of a Section 24G process. Section 24G of the NEMA, without affecting any criminal liability of a person who has acted in |

| Act | Regulations | Summary of requirements |
|--|---|---|
| | <p>Management Act, 1998 (Act No. 107 of 1998), as amended.</p> <p>GN No. 320 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity as published in Government Gazette 43110 dated 20 March 2020.</p> <p>GN No. 1150 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Plant and Terrestrial Animal Species as published in Government Gazette 43855 dated 30 October 2020.</p> | <p>contravention of the law, makes provision for that person to submit an application to the relevant MEC/Minister, which, if successful, will enable that person lawfully to continue with the listed activity and/or legalise an otherwise unlawful structure.</p> <p>Government Gazette 45421 dated 10 May 2019 as it relates to the Department of Forestry, and the Environment's (DFFE) national environmental screening report required with an application for environmental authorisation (EA) as identified in regulation 16(1)(v) of Environmental Impact Assessment (EIA) Regulations.</p> |
| National Forests Act (Act No. 84 of 1998) (NFA) | GN R 908 of 2014: List of Protected Tree Species under the National Forests Act | The National Forests Act provides protection for forests, woodlands and several specified species of trees, which are protected across South Africa. The latest list of protected trees, dating from 2014, contains a total of 47 species, specimens of which may not be cut or damaged without a permit. |
| National Heritage Resources Act (Act No. 25 of 1999) (NHRA) | National Heritage Regulations (GN R No. 548 of 2000) | <p>The NHRA provides for the protection and conservation of heritage resources in South Africa and for the establishment of the South African National Heritage Resources Agency (SAHRA) and general principles for heritage resources management. The Act requires Heritage Impact Assessments (Section 38 of the Act) for specified categories of development. Under Section 38(2) of the NHRA, the person intending to undertake such a development must submit a Heritage Impact Assessment (HIA) report to the responsible heritage authority. Section 38(8) of the NHRA provides for an HIA report to be integrated with an EIA process in terms of the NEMA.</p> <p>The National Heritage Regulations provide procedures for permitting various actions that may affect heritage objects, including their destruction, damage, removal and excavation.</p> |
| National Environmental Management: Waste Act (Act No. 59 of 2008) (NEM:WA) | GN R 921 of 2013: List of Waste Management Activities that have, or are likely to have, a Detrimental Effect on the Environment. | The NEM:WA provides for the regulation of waste and its responsible management and disposal. The List of Waste Management Activities specifies activities that require a WML. These activities, together with the Listed Activities in terms of the EIA regulations, may be authorised through an integrated EIA process. |
| National Environmental Management: Protected Areas Act (Act No. 57 of 2003) (NEM:PAA) | | The NEM:PAA objective is to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological biodiversity and its natural landscape and seascapes. Further, for the management of those areas in accordance with national norms and standards. |
| Conservation of Agricultural Resources Act (Act No. 43 of 1983) (CARA) | | The Act states that the removal and alien and weed species encountered in the application area must take place in order to comply with existing legislation and the removal Alien and Invasive Plants (AIP) and weed species should take place |

| Act | Regulations | Summary of requirements |
|---|---|---|
| Mpumalanga Nature Conservation Act (Act NO. 10 of 19998) (MNCA) | | <p>throughout the construction and operation phases, in line with an approved AIP Management Plan.</p> <p>The MNCA provides for the protection of indigenous plants. Subject to the provisions of the Act, no person shall:</p> <ul style="list-style-type: none"> ▶ Pick, be in possession of, sell, purchase, donate, receive as a gift, import into, export, or remove from the Province, or convey: <ul style="list-style-type: none"> I. A specially protected plant; or II. A protected plant. ▶ Pick any indigenous plant: <ul style="list-style-type: none"> I. A specially protected plant; or II. On a public road; On land next to a public road within 100 m measured from the centre of the road; III. Within an area bordering any natural watercourse, whether wet or dry, up to and within 50 m from the high watermark on either side of the natural watercourse; or IV. In a Provincial Park, a site of Ecological Importance or a Protected Natural Environment. |
| National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEM: BA) | GN R 598 of 2014: Alien and Invasive Species Regulations GN R 864 of 2016: Alien and Invasive Species Lists | The NEM: BA, through the Alien and Invasive Species Regulations and the Alien and Invasive Species Lists, identifies alien and invasive species and classifies them into a number of classes, which places obligations on the landowner. |
| | GN 1002 of 2011: National List of Ecosystems that are Threatened and in Need of Protection GN R 151 of 2007: Lists of Critically Endangered, Vulnerable and Protected Species GN R 152 of 2007: Threatened or Protected Species Regulations | <p>The NEM: BA provides for:</p> <ul style="list-style-type: none"> ▶ The management and conservation of biological diversity in South Africa; ▶ The uses of indigenous biological resources in a sustainable manner; and ▶ The fair and equitable sharing amongst stakeholders of benefits arising from bio-prospecting involving indigenous biological resources. <p>The Act provides for a range of measures to protect ecosystems and for the protection of species that are threatened or in need of protection to ensure their survival in the wild, including prohibition on carrying out a “<i>restricted activity</i>” involving a specimen of a listed threatened or protected species in terms of Chapter 7 of the Act. Lists of Critically Endangered, Endangered, Vulnerable and Protected Species have been published and a permit system for restricted activities has been established.</p> |
| | GN 1150 of 2020: Protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial plant species | This protocol provides the criteria for the specialist assessments and minimum report content requirements for impacts on terrestrial plant species for activities requiring environmental authorisation. The assessment and reporting requirements of this protocol are associated with a level of environmental sensitivity identified by the national web based environmental screening tool (screening tool) for terrestrial plant species which may occur on site. The relevant terrestrial plant species data in the screening tool has been provided by the South African National Biodiversity Institute (SANBI). |

| Act | Regulations | Summary of requirements |
|--|--|---|
| | GN 320 of 2020: Protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial biodiversity | This protocol provides the criteria for the specialist assessments and minimum report content requirements for impacts on terrestrial biodiversity for activities requiring environmental authorisation. The assessment and minimum reporting requirements of this protocol are associated with a level of environmental sensitivity identified by the national web based environmental screening tool (screening tool). The requirements for terrestrial biodiversity are for landscapes or sites which support various levels of biodiversity. The relevant terrestrial biodiversity data in the screening tool has been provided by the SANBI. |
| Environment Conservation Act, 1989 (Act No. 73 of 1989) (ECA) | GN R 154 of 1992: Noise Control Regulations Western Cape Provincial Notice No. 627 of 1998 | With some exceptions, most parts of the ECA have been repealed. One of the sections that remain in force is the one that enables noise control regulations. National noise control regulations in terms of the ECA are in force in all provinces that have not enacted their own noise legislation. |

2.3.2 Listed Activities in terms of NEMA

The NEMA provides the framework for environmental decision-making in the country and specifically the EIA Regulations (GN No. R982 in the Government Gazette of 8 December 2014, as amended) serve as the instrument through which development decisions are made.

South Africa has rigorous and comprehensive environmental legislation aimed at preventing degradation of the environment. Section 28(1) of NEMA places a “*duty of care and remediation of environmental damage*” on every person who causes, has caused, or may cause, significant environmental degradation. This is a far-reaching obligation, and accordingly, those parties responsible for the degradation of the environment have a legal duty to avoid, minimise or mitigate such impacts.

This has resulted in a set of Listed Activities that can be triggered by developments taking place in sensitive environments, e.g. watercourses. If a development triggers a Listed Activity, it is required to undergo an Environmental Impact Assessment (EIA) through a Basic Assessment (BA) process or Scoping and Environmental Impact Reporting (SEIR) in terms of the EIA Regulations (GN R982, as amended). The following listed activities, as shown in Table 5, have been identified as being applicable to this proposed project:

Table 5: Listed activities triggered by the proposed tourist facility

| Listing Notice and Activity No: | Description of relevant Listing Notice of the EIA Regulations, 2014 as amended. | Description of how the proposed project is applicable to the listed activity. |
|---------------------------------|--|--|
| GN R983, Activity no 12 | The development of – (v) weirs, where the weir, including infrastructure and water surface area, exceeds 100m ² in size; (x) buildings exceeding 100m ² in size; (xii) infrastructure or structures with a physical footprint of 100m ² or more; | Various proposed infrastructure, such as weirs, buildings and pipelines are located within a watercourse or within 32m of a watercourse. The approximate sizes of the proposed infrastructure, located within 32m of a watercourse are listed below: <i>Building footprint: 7,320 m²</i> <i>Attenuation pond: 340 m²</i> |

| | | |
|--------------------------------|--|---|
| | <p>Where such development occurs-</p> <p>(a) within a watercourse;</p> <p>(c) within 32m of a watercourse.</p> | |
| GN R983, Activity no 19 | <p>The infilling or depositing of any material of more than 10m³ into, or dredging, excavation, removal or moving of soil, sand, pebbles or rock of more than 10m³ from-</p> <p>(i) a watercourse.</p> | <p>Various infrastructure including weirs, stormwater attenuation ponds and pipelines are expected to affect the nearby riparian zones as delineated by the aquatic specialist.</p> |
| GN R983, Activity no 27 | <p>Clearance of an area of 1ha or more, but less than 20ha of indigenous vegetation.</p> | <p>More than 1ha of forest vegetation is expected to be cleared during construction. This is a mixture of indigenous and degraded forest. The clearance will be less than 20ha. The vegetation specialist report (attached in Annexure D) classifies the affected area which will be cleared to enable construction as being indigenous forest which is degraded. In addition to the building footprint, the upgrade of the footpaths will have an edge effect into the surrounding indigenous forest as well as habitat of plant species of conservation concern, including orchids. The total area to be cleared of vegetation is estimated at 14,960 m²</p> |
| GN R983, Activity no 48 | <p>(6) Expansion of infrastructure or structures where the physical footprint is expanded by 100 square metres or more</p> <p>Where such expansion occurs</p> <p>(a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.</p> | <p>The existing parking lot which currently measures approximately 2,862m², will be expanded to cover an area of 7,985 m². This is located within 32 metres of a watercourse.</p> |

| | | |
|---------------------------------------|--|--|
| <p>GN R985, Activity no 12</p> | <p>The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.</p> <p>f. Mpumalanga</p> <p>i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;</p> <p>ii. Within critical biodiversity areas identified in bioregional plans; or</p> <p>iii. On land, where at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning or proclamation in terms of NEMPAA.</p> | <p>More than 1ha of forest vegetation is expected to be cleared during construction. The clearance will be less than 20ha. The vegetation specialist report (Annexure D) classifies the affected area which will be cleared to enable construction as being indigenous forest which is degraded. In addition to the building footprint, the upgrade of the footpaths will have an edge effect into the surrounding indigenous forest as well as habitat of plant species of conservation concern, including orchids. The total area to be cleared of vegetation is estimated at 14,960 m²</p> |
| <p>GN R985, Activity no 14</p> | <p>The development of (i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or;</p> <p>(ii) infrastructure or structures with a physical footprint of 10 square metres or more;</p> <p>Where such development occurs-</p> <p>(a) within a watercourse (c) within 32m of a watercourse.</p> <p>f. Mpumalanga</p> <p><u>i. Outside urban areas:</u></p> <p>(aa) A Protected area identified in terms of NEMPAA, excluding conservancies</p> | <p>Various infrastructure, buildings, structures and the weir related to the stormwater attenuation ponds are proposed to be either within the riparian zone, or within 32m of the watercourse. The approximate sizes of the proposed infrastructure, located within 32m of a watercourse are listed below:</p> <p><i>Building footprint: 7,320 m²</i></p> <p><i>Attenuation pond: 340 m²</i></p> |

| | | |
|--|---|---|
| | <p>(dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;</p> <p>(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</p> <p>(hh) Areas within 10 kilometers from national parks or world heritage sites of 5 kilometers from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve, where such areas comprise indigenous vegetation.</p> | |
| Listing Notice and Activity No: | Description of relevant Listing Notice of the EIA Regulations, 2014 as amended. | Description of how the proposed project is applicable to the listed activity. |
| GN R983, Activity no 12 | <p>The development of –</p> <p>(v) weirs, where the weir, including infrastructure and water surface area, exceeds 100m² in size;</p> <p>(x) buildings exceeding 100m² in size;</p> <p>(xii) infrastructure or structures with a physical footprint of 100m² or more;</p> <p>Where such development occurs-</p> <p>(a) within a watercourse;</p> <p>(c) within 32m of a watercourse.</p> | <p>Various proposed infrastructure, such as weirs, buildings and pipelines are located within a watercourse or within 32m of a watercourse. The approximate sizes of the proposed infrastructure, located within 32m of a watercourse are listed below:</p> <p><i>Building footprint: 7,320 m²</i></p> <p><i>Attenuation pond: 340 m²</i></p> |

3 ROLES AND RESPONSIBILITIES

This Chapter provides a description of the roles and responsibilities of the various parties involved with the construction of the proposed development.

3.1 Contractor

The Contractor must ensure that all of its sub-contractors, employees, etc., are fully aware of the environmental issues detailed in this EMPr. The Contractor shall liaise closely with the Site Engineer (SE), Environmental Officer (EO) and the Environmental Control Officer (ECO) and must ensure that the works on site are conducted in an environmentally sensitive (prevent actions that may cause environmental harm) manner and fully in accordance with the requirements of the EMPr, at all times.

The contractor must ensure compliance of all site personnel/visitors to the EMPr and other conditions of approval where relevant.

3.2 Developer

Generally, the developer or applicant would refer to the holder of the Environmental Authorisation (EA), in this case Mapulana Canyon, who would assume overall responsibility for the administration and implementation of the EA and EMPr.

The developer will be responsible for the following tasks amongst others:

- ▶ Impact on landscape character and sense of place;
- ▶ Ensure that all conditions of approval as contained in the EA are adhered to;
- ▶ Ensure that the requirements as set out in this EMPr are adhered to and implemented;
- ▶ Ensure all authorisations, permits, consents are in place and any other legal requirements are settled before construction commences;
- ▶ Allocate the responsibilities assigned to the ECO to an independent suitably qualified individual prior to the start of construction activities on site; and
- ▶ Provide all principal contractors working on the project with a copy of this EMPr as part of tender contract documentation to allow the contractors to cost for its requirements within their respective construction contracts.

3.3 Site Engineer (SE)

The SE is responsible for ensuring that the contract is carried out to completion on time, in budget and that each Contractor fulfils his obligations in terms of conditions contained in the EA.

3.4 Environmental Control Officer (ECO)

The Developer shall appoint a suitably qualified ECO to monitor the Contractor's compliance in terms of this EMPr and the conditions contained in the EA, as well as address environmental site issues. The ECO shall work in close relation with the Contractor's appointed EO. The designation is reserved for a suitably qualified (National Diploma / Degree in Natural Science or an equivalent qualification), independent, environmental manager, with adequate environmental knowledge to understand and implement the EMPr.

The duties of the ECO include but are not limited to:

- ▶ Liaison with the Developer, Project Manager and/or Engineer and Mpumalanga Department of Agriculture, Rural Development, Land Reform and Environmental Affairs (DARDLEA);
- ▶ Update the EMPr to include relevant conditions of approval contained in the EA (if applicable);

- ▶ Conduct environmental induction training with the contractor prior to commencement of work (3.4.1);
- ▶ Undertake ECO site inspections. The frequency of site inspections can be determined between the ECO, SE, Environmental Site Agent (ESA) or any specific conditions of authorisation contained in the EA. It is recommended that the ECO be supported by a full-time ESA during the initial construction period/activities (see section 3.5 below) and that the ECO undertake monthly ECO inspections with the ESA. The ECO must attend/arrange a site meeting with the engineer, contractor and other relevant project team members during his/her site inspection to discuss any environmental matters;
- ▶ Compilation of ECO Reports that must be submitted to the project team, DARDLEA, and developer(or any other authority/body deemed necessary by the project team). The ECO must liaise with the ESA to ensure that action items are carried out;
- ▶ Review ESA weekly compliance monitoring reports and include information in monthly ECO Reports;
- ▶ Monitoring compliance with the various environmental conditions/requirements contained in the EA and EMPr;
- ▶ Assist the ESA in reviewing of the Contractor's method statements;
- ▶ Ensuring that the requisite remedial action is implemented in the event of non-compliance;
- ▶ Ensuring the proactive and effective implementation and management of environmental protection measures;
- ▶ Ensuring that a register of public complaints is maintained by the Contractor and that any and all public comments or issues are appropriately reported and addressed;
- ▶ Attend monthly site meetings; and
- ▶ Recording and reporting of environmental incidents.

3.4.1 Environmental Induction/Awareness Training

The ECO shall arrange with the Engineer and Contractor to conduct environmental induction training with personnel and must address, amongst others:

- ▶ Explanation of the environmental process that preceded the EA and why it was important to conduct the environmental process;
- ▶ Explanation of the conditions of authorisation contained in the EA;
- ▶ The sensitive environmental features located within and around the site;
- ▶ The reasons why mitigation measures are required and the benefits of implementing these measures;
- ▶ The EMPr and its contents (e.g. no-go areas, animals, littering etc.); and
- ▶ The role of the ECO and ESA.

3.4.2 Permits and Authorisations

Apart from the EA which needs to be in place prior to commencement of construction activities, the WUL must also be obtained from the Department of Water and Sanitation (DWS) before construction commences. Prior to construction, a botanist or ecologist must walk the final footprint of the development within the growing and flowering period of the Vulnerable plant species, to determine the number of protected floral species that might be displaced or that may be impacted on by the final development layout. Where individual plants or subpopulations of the Vulnerable species, as well as provincially protected plants will be impacted on, these plants must be removed and replanted by a botanist or horticulturist. This can only take place once the developer has been granted a permit to do such work.

The ECO must be knowledgeable of licencing and permitting requirements (issued and required) for the project and can assist the contractor with obtaining such permits.

3.5 Environmental Site Agent (ESA)

It is recommended that an independent ESA be appointed for the duration of construction (appointment must take place prior to commencement of any construction activities). The ESA will assist the ECO with day-to-day on-site monitoring of construction activities, compliance with this EMPr and specific conditions contained in the EA. The ESA's terms of reference include, but are not limited to:

- ▶ Day to day monitoring of implementation of this EMPr;
- ▶ It is recommended that the ESA be on site daily when work is being undertaken in sensitive environments e.g. watercourses, vegetation and during the initial construction activities which include amongst others site demarcation, identification of no-go areas, relocation of vegetation, vegetation clearance, site camp establishment and vegetation replantation;
- ▶ The ESA must assist the contractor with environmental training of any new staff members or staff which did not attend the ECO's environmental induction training. On-going environmental awareness also falls within the responsibilities of the ESA;
- ▶ Submit weekly compliance reports to the ECO;
- ▶ Attend contractor and engineering site meetings where relevant or where attendance is requested;
- ▶ Maintain a detailed photographic record of construction activities;
- ▶ Maintain a register of site instruction, non-compliances and action items and submit weekly to the ECO;
- ▶ Keep all approved method statements on record/file.
- ▶ Liaise with the public should there be any complaints, keep a register of any complaints and report to the ECO on weekly basis; and
- ▶ The ESA must immediately consult with the SE and ECO should any non-compliances meriting a 'stop-work' instruction be observed.

3.6 Environmental Authority

The DARDLEA is the competent authority responsible for issuing the EA and compliance with the conditions of authorisation contained in the EA and relevant environmental legislation. It has the following powers with respect to the project:

- ▶ Overall enforcement of the EA and its conditions of authorisation;
- ▶ Review the EMPr and any required updates or revisions;
- ▶ Compliance inspection site visits;
- ▶ Review ECO and audit reports (if required by the EA);
- ▶ Review incident reports (if required by the EA); and
- ▶ Enforcement in the event of contraventions of the EMPr or EA.

3.7 Working Area

The working area is regarded as the land and any other place on, under, over, in or through which the works are to be executed or carried out, and any other land or place made available by the developer in connection with the works. The Working Area shall include the site office, construction camp, stockpiles, batching areas, the construction area, all access routes (from the point where it leaves the nearest public road) and additional areas to which the Engineer permits access. The construction footprint must be kept to a minimum.

The site must be clearly, and appropriately demarcated and no-go areas must be clearly identified with appropriate signage. The ECO must brief contractor staff regarding the requirements of no-go areas.

All works must be kept within the authorised footprint of the site. Areas disturbed outside of the site footprint must be rehabilitated through consultation with the ECO.

4 ENVIRONMENTAL IMPACTS AND MITIGATION

During the EIA process, several specialist studies identified and assessed various impacts, and mitigation measures were recommended to address these impacts. The outcome and intent of the impact management recommendations i.e., mitigation measures, is to reduce the level of an impact on the environment. In line with the mitigation hierarchy, the preference is for avoidance of impacts, followed by mitigation and compensation. Figure 4-1 and Figure 4-2 illustrate the assessed sensitivities.

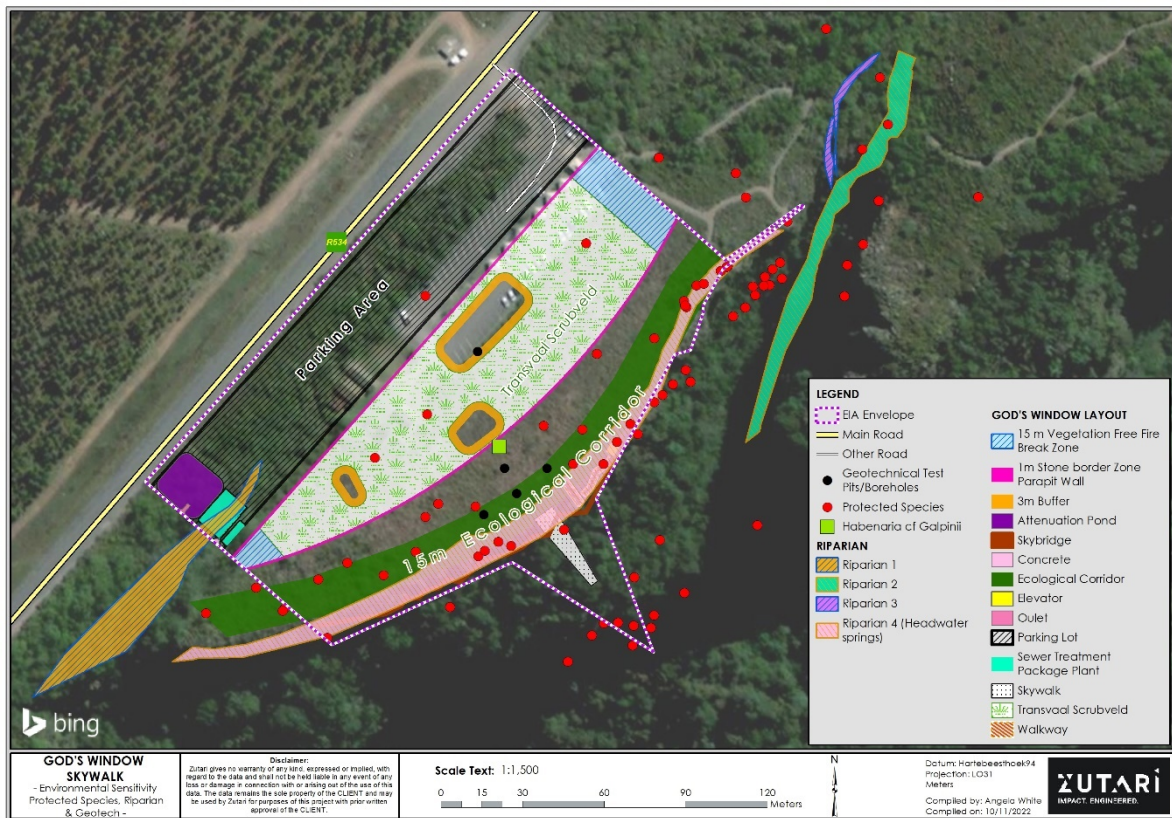


Figure 4-1: Environmental sensitivity map - protected species and riparian zones

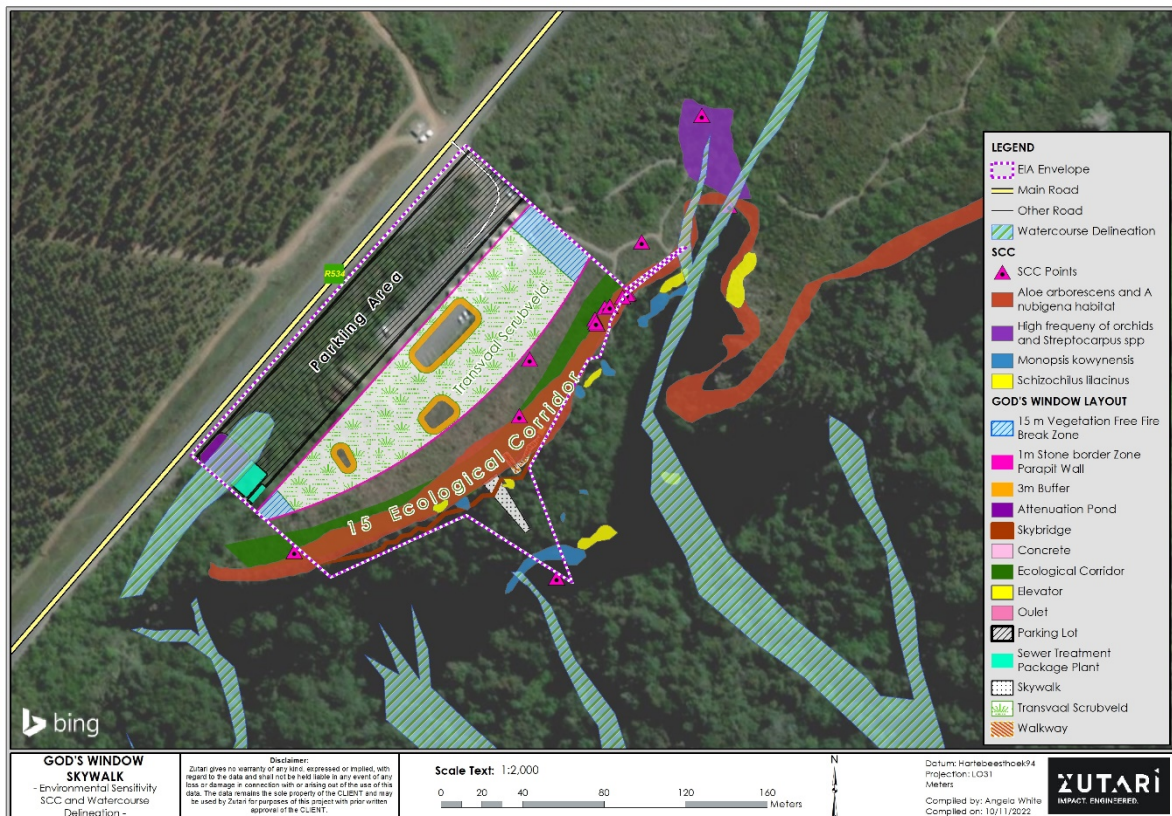


Figure 4-2: Environmental sensitivity map - species of conservation concern and watercourse delineation

Provided below is a summary of the impacts and their recommended mitigation measures as detailed in the EIA specialist studies. These mitigation measures must be implemented together with the mitigation measures as set out in the Construction, Operational and Decommissioning Environmental Management Chapters below.

4.1 Biodiversity

The biodiversity specialist reports included terrestrial (fauna and flora) and freshwater aquatic assessments to determine the potential impacts and provide specialist-recommended mitigation measures.

In the next sections, the nature of the impact is described and followed by specialist recommended mitigation measures.

4.1.1 Fauna Assessment

4.1.1.1 Loss of Habitat and Faunal Species Diversity during the Operational Phase

Impact description: Clearance of vegetation for the proposed infrastructure leading to habitat loss, decreased food resources and displacement of faunal species from these areas.

4.1.1.1.1 Mitigation

Connectivity within the landscape needs to be maintained to ensure faunal movement along the escarpment and as such a movement corridor (15m) as incorporated into the design as an ecological footprint must be maintained. No infrastructure besides lifted walkways (limited to 2m in width) and the

skybridge should be proposed therein. The footprint areas are to remain as small as possible with only those are necessary being cleared. As much herbaceous and shrubland vegetation as possible must remain under the walkways.

Small reptile and arachnid species, should they not self-relocate, must be carefully moved to habitat outside of the disturbance footprint. Vegetation clearance will have to be done in a phased manner, ideally working from the southern portion of the study area northwards. This will provide faunal species the opportunity to move out of the area ahead of the clearance activities. All cleared vegetation should be restored on the roof of any infrastructure be vegetated.

If possible, construction should occur during spring or autumn (when bats are moving to seek new roosts). Consider the creation / rehabilitation of small "islands" of habitat within the development footprint. As far as possible the installation of the anchor points for the skybridge and skywalk along the cliff face must be done in such a way as to minimise vibrations and noise impacts. Bird flappers should be installed along any suspended cables. Where feasible, the skywalk's glass platform should be treated to ensure a heightened visibility for birds to avoid collisions and subsequent avifaunal mortalities.

The skywalk planned along the cliff face should be positioned in such a way as to not impact on at roosting sites for bats or interfere with any cliff nesting avifauna.

4.1.1.2 Loss of Habitat and Faunal Species Diversity during the Operational Phase

Impact description: Maintenance activities and edge effects leading to habitat degradation and decreases in faunal species diversity and abundance.

4.1.1.2.1 Mitigation - Construction

Manage alien plant proliferation in disturbed areas and footprints. No catching / hunting of faunal species during operational activities. Manage erosion to ensure further habitat degradation does not occur. Do not clear vegetation unnecessarily. Night lighting should be kept to a minimum. No lighting, which may attract insects and their predators, should be installed over the cliff face. No persecution or collection of fauna or flora may be allowed.

No further pathways or obstructions should be allowed to develop within the proposed development area and especially within the 15m ecological buffer.

4.1.1.3 Impact on Faunal SCC during the Construction Phase

Impact description: Potential loss of faunal SCC from the affected areas due to habitat degradation and/or loss as well as risk of direct mortalities resulting from collisions with vehicles. Human - wildlife conflict and potential harvesting for wildlife trade during construction activities may also impact on SCC in the affected areas.

4.1.1.3.1 Mitigation

Vehicles to use designated roads as far as possible. No paths should be created by inquisitive tourists. Minimise vegetation clearance to only what is needed. No collection or destruction of faunal species and SCC is to occur. SCC to be relocated outside of disturbance footprint if they do not relocate themselves (Professional help may be required for such). If at all possible construction should occur during spring or autumn (when bats are moving to seek new roosts).

4.1.1.4 Impact on Faunal SCC during the Operational Phase

Impact description: Potential loss of faunal SCC from the affected areas due to habitat degradation and/or loss as well as risk of direct mortalities resulting from collisions with vehicles. Human - wildlife conflict and potential harvesting for wildlife trade may also impact on SCC in the affected areas.

4.1.1.4.1 Mitigation

Maintain existing habitat in a good ecological condition with suitable corridors implemented. No collection or trapping of faunal SCC. Manage edge effects, habitat degradation and alien plant proliferation. Nocturnal lighting should be kept to a minimum. No lighting, which may attract insects and their predators, should be installed over the cliff face. Where SCC are located a rescue and relocation plan must be undertaken with the guidance of a suitably qualified specialist and the relevant permits.

4.1.2 Floral Assessment and Plant Species Assessment

4.1.2.1 Destruction of natural vegetation of medium sensitivity

4.1.2.1.1 Nature of impact during construction

- ▶ The proposed layout will remove the entire *Passerina montana-Scelria transvaalensis* scrubveld. The removal of vegetation from the site could also lead to a loss in the current ecological function (e.g., groundwater recharge zone) and general loss of species and genetic diversity;
- ▶ The removal of this vegetation could have a detrimental indirect effect on the vegetation of the cliff face (e.g. effect on the hydrology of the area);
- ▶ Areas that will not be developed, but that may be impacted on by construction related activities (e.g. where building materials are stored) must also be considered; and
- ▶ In addition, the illegal disposal of construction material such as oil, could leach into oils which maybe hydrologically connected tot eh vegetation on the cliff face, thereby impacting on it.

4.1.2.1.2 Nature of impact during construction

- ▶ Edge effects include trampling by visitors – if any of this vegetation remains;
- ▶ It is likely that fire will be prevented to safeguard infrastructure, which could result in a change of the vegetation structure (increased woody vegetation) around the development and reduction of scrubveld; and
- ▶ Lack of ecological corridor for movement of species / pollinators above the cliff face.

4.1.2.1.3 Mitigation

4.1.2.1.3.1 Planning Phase

- ▶ Reduce the proposed development footprint to allow the conservation of some *Passerina montana-Scleria transvaalensis* scrubveld as open space around or within the development. This will ensure an ecological pathway thought the development and conservation of species. I can also help maintain the function of this vegetation as groundwater recharge zones. However, such vegetation will have to be managed to ensure it persists;
- ▶ The planned layout of the site must ensure that visitors activities can be restricted to a footprint and not sprawl out of control (e.g., increase in informal footpaths paths e.g. people taking shortcut through naturally vegetated areas). In this regard, it is recommended that no destructive activities such as quad biking or mountain biking are ever allowed as part of the entertainment at the site;
- ▶ Planning of the construction site must incorporate eventual rehabilitation of areas destroyed / damaged by construction and that does not contain infrastructure;
- ▶ Construction camps and laydown areas for equipment and materials must be planned outside of sensitive vegetation and may not be placed within areas that are not earmarked for development; and

- ▶ The activities on the site should be managed in accordance with an ecological management plan. This plan must include the construction as well as the operational phase of the development.

4.1.2.1.3.2 Construction Phase

An independent Ecological Control Officer (ECO) should be appointed to oversee construction, and:

- ▶ Keep the development footprint as small as possible;
- ▶ Ensure that the areas that are not to be developed are protected from construction and related activities;
- ▶ A temporary fence or demarcation must be erected around the construction area (include the actual footprint, as well as areas where material is stored) to prevent access to adjacent sensitive vegetation;
- ▶ Maintain site demarcations in position until the cessation of construction work;
- ▶ Only remove vegetation where necessary and retain vegetation in place for as long as possible prior to removal;
- ▶ Prohibit vehicular or pedestrian access into natural areas beyond the demarcated boundary of the construction area;
- ▶ Formalise access roads and make use of existing roads and tracks where feasible, rather than creating new routes through naturally vegetated areas;
- ▶ A vegetation rehabilitation plan should already be implemented during construction to rehabilitate areas that will be affected by edge effects. Such a plan should use indigenous species from the study area and must restore disturbed areas beyond the footprint of the infrastructure to what it was prior to construction, thereby making the impact on the remainder of the site negligible in the long term. Natural colonisation could take a long time, in which vegetation may degrade further or become dominated by encroacher or alien invasive plant species. Therefore, timeous rehabilitation is imperative. Even in the event of good rains, annual pioneer plants are short-lived and therefore an effort must be made to keep as many shrubs in place as possible or to replace these as part of rehabilitation;
- ▶ Where topsoil needs to be removed, store such in a separate area where such soils can be protected until they can be re-used for post-construction rehabilitation where applicable. Never mix topsoil with subsoils or other spoil materials;
- ▶ After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land must be left in a condition as close as possible to that prior to construction;
- ▶ Prevent spillage of construction material, oils or other chemicals, strictly prohibit other pollution;
- ▶ Ensure there is a method statement in place to remedy any accidental spillages immediately;
- ▶ Do not dump litter or material within any vegetated areas; and
- ▶ No open fires are permitted during construction.

4.1.2.1.3.3 Operational Phase

Rehabilitate construction camps and any other vegetation that was impacted on by the construction. Any disturbances to the adjacent vegetation must be rehabilitated in accordance with the rehabilitation plan. This includes prevention of infestation by alien and invasive plant species on the site.

- ▶ Use indigenous plants local to the area where needed to stabilise soils, provide shade etc;
- ▶ No alien and invasive plant species as listed on 18 September 2020 in the list of Alien Invasive Species published in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004) (Government Gazette No 43726 of 2020) may be planted or allowed to grow within the development;
- ▶ Maintenance, security or operational workers may not trample natural vegetation beyond the site and must be restricted to previously disturbed footprint;
- ▶ After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land must be left in a condition as close as possible to that prior to construction;
- ▶ Do not plant shade trees that does not naturally occur at God's Window;

- ▶ Erect signage educating visitors on sensitive environment and the result of edge effects; and
- ▶ Ensure that visitors stay on dedicated paths and not remove plants.

4.1.2.2 Destruction of natural vegetation of high and very high sensitivity

4.1.2.2.1 Nature of impact during construction

- ▶ Removal and damage to the *Aloe arborescens-Clivia caulenscens* cliff face vegetation (very high sensitivity);
- ▶ The damage to or destruction of vegetation along the vertical cliff which was rated as very high sensitivity (constructing of skywalk and skybridge);
- ▶ Edge effects into the mistbelt forest surrounding the development, as well as below the cliff face (high sensitivity);
- ▶ Areas that will not be developed, but that may be impacted on by construction related activities (e.g., where building materials are stored) must also be considered;
- ▶ Falling objects / building material dropped from the construction site onto these sensitive systems; and
- ▶ Contaminated rainwater from the construction site, could wash down the cliff during heavy rainfall.

4.1.2.2.2 Nature of impact during operation

- ▶ Edge effects include trampling by visitors, removal of plants along the skywalk, as well as maintenance activities;
- ▶ Overshadowing of vegetation underneath the Skywalk and Skybridge;
- ▶ Rain shadow effect caused by the infrastructure, preventing mist and rainfall on plants along and below the Skywalk and Skybridge;
- ▶ Magnifying effect of sunlight being concentrated through the glass skywalk, potentially burning plants;
- ▶ Water being channelled, and flow concentrated from the bridge or skywalk downwards can dislodge sensitive plant species. These species grow in shallow soils in crevices and can easily be dislodged;
- ▶ Falling objects from visitors and litter;
- ▶ Chemicals used to clean the skywalk and skybridge can drip or be flushed from the surfaces and will likely kill plant species on the cliff face and change soil pH; and
- ▶ A faulty Prestressed Steel Tank and the associated pipeline will result in damage to forest vegetation as well as erosion within vegetation that harbours plant species of conservation concern.

4.1.2.2.3 Mitigation

4.1.2.2.3.1 Planning Phase

- ▶ The development layout should be set back from the cliff edge to protect and conserve the *Aloe arborescens-Clivia caulenscens* cliff face vegetation. This vegetation includes a Vulnerable species, a Near-Threatened species as well as a Data deficient species. A set back of a minimum of 15m from the cliff edge will protect the vegetation from edge effects. Only the access to the skywalk and skybridge may traverse this vegetation;
- ▶ A vegetation specialist must assess the final footprint on this vegetation to determine the species that will need to be relocated. Where such species are within the development footprint, they may only be removed once a permit for the removal / pruning was granted by the relevant authority;
- ▶ The panels of the skybridge must be manufactured from material that will let sunlight through, without concentrating the light which could burn sensitive plants below the skywalk;

- ▶ Ideally these panels should allow rainwater through, without concentrating / channelling the water onto plant species below the skywalk. These species grow in very shallow soils in crevices or on rocks and can easily be dislodged by concentrated waterflow;
- ▶ Position the skybridge away from the cliff face (e.g., allow for a gap between the cliff face and the skybridge). This should allow rainwater to trickle down the cliff face unhindered and limit the impact on the vegetation on the cliff face;
- ▶ Keep the width and length of the skywalk as narrow and short as possible as to limit its impact on the cliff face. Ideally, the skywalk should be reconsidered due to its likely impact on sensitive plant species;
- ▶ Ensure that litter can not fall from the skywalk or skybridge (e.g. place nets along the skywalk / below it, to prevent litter falling down to the forest); and
- ▶ Design a stormwater management plan that will prevent any water from the development footprint from running down the cliff face.

4.1.2.2.3.2 Construction Phase

- ▶ An independent ECO should be appointed to oversee construction;
- ▶ Keep the development footprint within the high and very high SEI as small as possible;
- ▶ Prevent polluted water running off the construction area and down the cliff or within the forested areas - implement a storm water management plan;
- ▶ Keep the work area (e.g. area to be disturbed) to a minimum. Manual labour is recommended in high and very high sensitivity areas, with no heavy vehicles driving over or turning within the high SEI areas;
- ▶ A temporary fence or demarcation must be erected around the construction area (include the actual footprint, as well as areas where material is stored) to prevent access to adjacent vegetation;
- ▶ Place nets under the construction site to prevent falling building material impacting on the Aloe arborescens-Clivia caulenscens cliff face vegetation, vegetation along the cliff face and the forest below. The erection of these nets should however be overseen by a suitably qualified botanist to ensure that the various threatened plants that have been recorded on the cliffs are not damaged;
- ▶ Prohibit vehicular or pedestrian access into natural areas beyond the demarcated boundary of the construction area;
- ▶ No open fires are permitted within naturally vegetated areas;
- ▶ Implement a vegetation rehabilitation plan. Natural colonisation could take a long time, in which vegetation may degrade (bush encroachment) or be invaded by alien invasive plant species. Therefore, timeous rehabilitation is imperative;
- ▶ Construction workers may not remove flora and neither may anyone collect seed from the plants without permission from the local authority;
- ▶ Where topsoils need to be removed, store such in a separate area where such soils can be protected until they can be re-used for post-construction rehabilitation:
- ▶ Never mix topsoils with subsoils or other spoil materials;
- ▶ Maintain site demarcations in position until the cessation of construction work; and
- ▶ After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land must be left in a condition as close as possible to that prior to construction.

4.1.2.2.3.3 Operational and Maintenance Phase

- ▶ After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land must be left in a condition as close as possible to that prior to construction;
- ▶ Ensure that maintenance work does not take place haphazardly, but according to a fixed plan;
- ▶ Cordon off areas that are under rehabilitation as no-go areas. If necessary, these areas should be fenced off to prevent vehicular, and pedestrian access;
- ▶ Maintenance workers may not trample natural vegetation and work should be restricted to previously disturbed footprint. In addition, mitigation measures as set out for the construction phase should be adhered to;

- ▶ Do not use chemicals to clean the skywalk and skybridge. Cleaning solutions made of organic ingredients and that are biodegradable should be used, and even then, these solutions should not be allowed to drip or wash off the surfaces;
- ▶ Visitors should not be allowed to take any food or beverages onto the Skywalk and Skybridge, this will limit the possibility of rubbish thrown into the cliffs and mistbelt forest below the walks; and
- ▶ Ensure stormwater management systems are regularly checked and cleared of debris.

4.1.2.3 Removal / Destruction of protected plants and plants of conservation concern

4.1.2.3.1 Nature of impact during construction

- ▶ The development will necessitate the removal of plant species of conservation concern, impact on their habitat conditions, pollinators and inevitably the persistence of these species (particularly along the vertical cliff and within the Aloe arborescens-Clivia caulescens cliff face vegetation. This could put further strain on the already declining populations;
- ▶ Falling objects could dislodge sensitive species from the cliff face; and
- ▶ The upgrade of pathways will destroy protected tree species and plant species of conservation concern.

4.1.2.3.2 Nature of impact during operation

- ▶ Falling objects and litter, as well as channelled stormwater could dislodge sensitive species from the cliff face;
- ▶ Visitors could pluck flowers and remove plants along the skywalk area; and
- ▶ The skywalk could overshadow sensitive species, or concentrate sunlight and alter the species microhabitat, ultimately causing its demise.

4.1.2.3.3 Mitigation

4.1.2.3.3.1 Planning Phase

- ▶ Limit the development footprint and the developments impact on areas of very high and high SEI ;
- ▶ Reconsider the need for a skywalk compared to the need to conserve sensitive plant species. As best practise, the skywalk should be limited in its extent and thus resulting impacts;
- ▶ The development should be set back a minimum of 15m from the cliff edge, thereby conserving the Aloe arborescens-Clivia caulescens cliff face vegetation;
- ▶ It is also recommended that the development takes place in a phased approach. The impact of the development on the sensitive plant species on the vertical cliffs can not be entirely foreseen or envisaged as it has not been studied. A Phased approach (e.g. parking, restaurant and Skybridge as Phase 1) could provide time to study the impact of the development prior to phase 2 of the development (skywalk and additions to the restaurant and visitors centre);
- ▶ The final development layout should be made available to the specialist prior to the plant species assessment that will search for additional plant species of conservation concern. The development footprint will be ground-truthed to verify the impact on the sensitive species;
- ▶ Sensitive species that are under threat from the construction activity, must be removed by a suitably qualified specialist and replanted as part of vegetation rehabilitation after the construction (note, these plants may only be removed with the permission of the provincial authority);
- ▶ Implement a plant relocation plan for plant species of concern that was recorded. For species that can not be relocated (e.g. large trees), apply for permit for the pruning / removal thereof;
- ▶ If the development is to proceed, a management plan for these species, during construction and operation, must be implemented and regularly monitored and reported on to the MTPA. The management body of the development should undertake to conserve and monitor the remaining

numbers of these plants along the *Aloe arborescens-Clivia caulenscens* cliff face and the vertical cliffs; and

- ▶ The final method and plan for upgrading the pathways needs to be submitted to the specialist in order to mark species that must be avoided by the upgrade activities, or be relocated.

4.1.2.3.3.2 Construction Phase

- ▶ Where possible, the species of conservation concern that were confirmed to occur, should be avoided by construction and related activities. The species should be marked or cordoned off to protect them from construction activities and vehicles. Construction workers should be made aware of the species and the aim to protect them from damage;
- ▶ Prior to construction, a botanist or ecologist must walk the final footprint of the development within the growing and flowering period of the Vulnerable plant species, to determine the number that might be displaced or that may be impacted on by the final development layout;
- ▶ Where individual plants or subpopulations of the Vulnerable species, as well as provincially protected plants will be impacted on, these plants must be removed and replanted by a botanist / horticulturist. This can only take place once the MTPA has granted a permit to do so;
- ▶ Any additional development, other than this proposed development which should still reduce its footprint, is not supported by this assessment;
- ▶ Construction workers may not remove any plants, seeds or plant parts other than that necessary for the development footprint;
- ▶ Before construction is initiated, all areas earmarked for an authorized development must be fenced off from those areas to be retained as an open space system, and all construction-related impacts (including service roads) must be contained within the fenced-off development areas; and
- ▶ As per above, implement an ecological management plan. This must take place prior to the start of the operational activities and include:

An Ecological Management Plan must be compiled by a suitably qualified ecologist (at least a BSc (Hons) in Plant Ecology or equivalent) as approved by the CA.

The implementation of the Ecological Management Plan is the responsibility of an appropriate management authority, such as the management company or section 21 company, vested with the authority to ensure the correct ecological management of the area where the Red List Plant Species population is growing.

The Ecological Management Plan must –

- ▶ Ensure the persistence of the Red List Plant Species population;
- ▶ Include a monitoring programme that monitors the size, stage structure and vigour of the Red List Plant Species population as well as threats to the population;
- ▶ Facilitate/augment natural ecological processes such as fire and herbivory;
- ▶ Provide for the habitat and life history needs of important pollinators;
- ▶ Minimise artificial edge effects (e.g. water runoff from developed areas and application of chemicals);
- ▶ Include an ongoing monitoring and eradication programme for non-indigenous species with specific emphasis on invasive and weedy species;
- ▶ Result in a report back to the Department on an annual basis; and
- ▶ Mitigatory measures are required to protect the Red List Plant Species population during construction.
- ▶ The ECO should take note of any unearthed geophytes or orchids and contact a specialist for the correct naming and threat status of the species. This will determine whether any follow-up action is required; and
- ▶ Construction workers may not tamper or remove these plants and neither may anyone collect seed from the plants without permission from the local authority.

4.1.2.3.3.3 Operational Phase

- ▶ The relocated species should be monitored for at least three years post relocation. If die back is noted, a specialist should be consulted, and corrective action taken as soon as possible;
- ▶ Monitor the impact of the operations on the plant species and vegetation and report back to the Department on an annual basis;
- ▶ Do not use chemicals to clean the skywalk and skybridge. Cleaning solutions made of organic ingredients and that are biodegradable should be used, and even then, these solutions should not be allowed to drip or wash off the surfaces;
- ▶ Visitors should not be allowed to take any food or beverages onto the Skywalk and Skybridge, this will limit the possibility of rubbish thrown into the cliffs and mistbelt forest below the walks. The area below the Skywalk complex should be cleaned every four (4) months from any rubbish by qualified rope access technicians;
- ▶ Ensure stormwater management systems are regularly checked and cleared of debris; and
- ▶ Educate visitors and prevent removal of and accessibility to plant species of conservation concern.

4.1.2.4 Potential increase in invasive vegetation, including alien species and indigenous encroacher species

4.1.2.4.1 Nature of impact during construction

- ▶ The seed of alien invasive plant species that occur on and in the vicinity of the construction areas could spread into the disturbed and stockpiled soil;
- ▶ Also, the construction vehicles and equipment were likely used on various other sites and could introduce alien invasive plant seeds or indigenous plants not belonging to this vegetation unit to the construction site; and
- ▶ In addition, if rehabilitation of the indigenous vegetation along the route, are unsuccessful or is not enforced, exotic and invasive vegetation may further invade the area.

4.1.2.4.2 Nature of impact during operation

Introduction of alien species via landscaping or visitors.

4.1.2.4.3 Mitigation

4.1.2.4.3.1 Construction Phase

- ▶ Alien invasive species, in particular category 1b species that were identified within the study area, should be removed from the development footprint and immediate surrounds, prior to construction or soil disturbances. By removing these species, the spread of seeds will be prevented into disturbed soils which could thus have a positive impact on the surrounding natural vegetation;
- ▶ Two aggressive category 1b species were recorded within the *Aloe arborescens-Clivia caulescens* cliff face vegetation. These species readily set seed and has already spread down towards the forests. These species should be removed by qualified persons such as the Working for Water High Altitude team that are trained in rappelling;
- ▶ All alien seedlings and saplings must be removed as they become evident for the duration of construction;
- ▶ All construction vehicles and equipment, as well as construction material should be free of plant material. Therefore, all equipment and vehicles should be thoroughly cleaned prior to access on to the construction areas. This should be verified by the ECO; and
- ▶ If filling material is to be used, this should be sourced from areas free of invasive species.

4.1.2.4.3.2 Operational Phase

- ▶ No alien and invasive plant species as listed on 18 September 2020 in the list of Alien Invasive Species published in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004) (Government Gazette No 43726 of 2020) may be planted within the development;
- ▶ Only use indigenous species naturally occurring on the site for rehabilitation or landscaping. No trees that are not natural to the Gods Window area may be planted at parking areas or the development landscape. Rather, the areas should be rehabilitated to the natural occurring vegetation;
- ▶ Implement an alien invasive plant monitoring and management plan whereby the spread of alien and invasive plant species into the areas disturbed by the construction are regularly removed and re-infestation monitored. This plan should regularly be updated and be implemented for the entire operational phase of the development; and
- ▶ Remove alien invasive species from the Gods Window area as soon as they become apparent.

4.1.2.5 Clearing of land for construction camps and potential pollution of the soil and water

4.1.2.5.1 Nature of impact

These may be at one or several locations, area will be cleared and levelled where necessary, site offices may be temporary structures, machinery, building supplies and temporary staff facilities (excluding accommodation) will be housed here. The impacts could include:

- ▶ Removal of vegetation;
- ▶ Levelling and compaction of soils; and
- ▶ Storage of machinery, supplies and staff facilities.

This could lead to the loss of vegetation and/or species of conservation concern, alteration, and loss of microhabitats, altered vegetation cover, increased erosion and contamination of soil and groundwater.

4.1.2.5.2 Mitigation

4.1.2.5.2.1 Construction Phase

- ▶ Keep the clearing of natural vegetation to a minimum and locate construction camps within transformed or modified areas;
- ▶ After the final layout has been approved, conduct a thorough footprint investigation to determine any protected plant species population location and size;
- ▶ Stay within demarcated temporary construction areas and strictly prohibit any off-road driving or parking of vehicles and machinery outside designated areas;
- ▶ Prevent spillage of construction material and other pollutants, contain, and treat any spillages immediately, strictly prohibit any pollution/littering according to the relevant EMPr;
- ▶ No open fires may be lit for cooking or any other purposes, unless in specifically designated and secured areas;
- ▶ Facilities may not be used as staff accommodation;
- ▶ No vehicles may be washed on the property, except in suitably designed and protected areas;
- ▶ No vehicles may be serviced or repaired on the property, unless it is an emergency in which case adequate spillage containment must be implemented;
- ▶ After construction remove all foreign material prior to starting the rehabilitation;
- ▶ The rehabilitation plan for all temporarily affected areas must aim to re-introduce species naturally occurring in the area; and
- ▶ Monitor the establishment of invasive species and remove as soon as detected, whenever possible before regenerative material can be formed.

4.1.2.5.2.2 Operational Phase

Monitor all sites disturbed by construction activities for colonisation by exotics or invasive plants and control these as they emerge. Monitoring should continue for at least two years after construction is complete.

4.1.2.6 Compaction and destruction of soils

4.1.2.6.1 Nature of impact

The movement of heavy machinery over vegetated areas during construction and maintenance will result in soil compaction that will modify habitats, destroy vegetation, and inhibit re-vegetation. Soil compaction because of vehicles and traffic, could lead to a decrease of water infiltration and an increase of water runoff. Such areas are more likely to be colonised by pioneer, alien invasive plant species, than indigenous species. This will further transform the vegetation of the area. The health of the topsoil is imperative for re-vegetation. Incorrect stripping, handling and storage could lead to failed rehabilitation.

4.1.2.6.2 Mitigation

4.1.2.6.2.1 Construction Phase

- ▶ Vehicles and machinery may not veer from the dedicated roads;
- ▶ Once construction is complete, obsolete roads should be obliterated by breaking the surface crust and erecting earth embankments to prevent erosion, while the natural species composition should be re-established;
- ▶ Prior to construction, the topsoil must be removed and stored separately from subsoil. The topsoil is imperative for the successful re-establishment of indigenous vegetation and it carries seed from the existing vegetation;
- ▶ Topsoil (the upper 25 cm of soil) is an important natural resource; where it must and can be stripped, never mix it with subsoil or any other material, store and protect it separately until it can be re-applied, minimise handling of topsoil;
- ▶ Topsoil is typically stored in berms with a width of 150 – 200 cm, and a maximum height of 100 cm, preferably lower, ideally in a disturbed but weed-free area. Place berms along contours or perpendicular to the prevailing wind direction;
- ▶ Rapid decomposition of organic material in warm, moist topsoils decreases microbial activity necessary for nutrient cycling, and reduces the number of beneficial micro-organisms in the soil. Therefore, topsoil should therefore not be stored for extensive periods and it is recommended that the reapplication of topsoil takes place as soon as possible. Adhere to the following general rule: the larger the pile of topsoil storage needs to be, the shorter should be the time it is stored;
- ▶ Topsoil handling should be limited to stripping, piling (once), and re-application; and
- ▶ Any movement of heavy machinery or vehicles over stored topsoils must be strictly prohibited.

4.1.2.6.2.2 Operational Phase

Maintenance / operational vehicles may not deviate from dedicated roads.

4.1.2.7 Destruction of unique rocky habitats and trees

4.1.2.7.1 Nature of impact

Parts of the development falls on rocks that create the unique habitat, might be destroyed, or shifted. In addition, large trees might be removed, or the roots severed, which could result in diseases and trees toppling.

4.1.2.7.2 Mitigation

4.1.2.7.2.1 Planning Phase

- ▶ The planning layout must impact on as little vegetation as possible. The need to remove trees, shrubs and undergrowth must be limited;
- ▶ Workers must undergo environmental awareness training and understand the need to limit impacts on the natural environment;
- ▶ Do not remove large rocks or break boulders. Incorporate the rocks into planning of the development footprint; and
- ▶ Do not remove large and unique trees along the footpaths, or orchids and other protected species.

4.1.2.7.2.2 Construction Phase

- ▶ Keep the development footprint and areas to be disturbed as small as possible; and
- ▶ Prevent damage to trees and shrubs that are not directly within the development footprint.

4.1.2.7.2.3 Operational Phase

- ▶ Maintain clear footpaths to prevent random access of visitors over rocks where they could trample smaller vegetation; and
- ▶ Monitor the survival of relocated species.

4.1.2.8 Modification of the natural vegetation

4.1.2.8.1 Nature of impact

Post construction, the vegetation within the development footprint might be landscaped and irrigated. This could change the species composition and abundance (or density) of the vegetation around the development footprint. Lush areas around the development could encourage a variety of birds to the area, which can spread seed of plant species not naturally occurring in the area.

4.1.2.8.2 Mitigation

4.1.2.8.2.1 Planning Phase

- ▶ Limit the need for rehabilitation and landscaping of vegetation;
- ▶ The landscape plan should only make use of species naturally occurring within the Gods Window area; and
- ▶ Irrigated areas should be kept to a minimum

4.1.2.8.2.2 Construction Phase

- ▶ Erect a temporary fence or demarcation around the construction area to prevent access to sensitive environs;
- ▶ No random-access routes, equipment storage or construction camps may be situated in the watercourse; and
- ▶ Prevent the unnecessary removal and trampling of vegetation.

4.1.2.8.2.3 Operational Phase

- ▶ No operational activities may directly impact on the vegetation of very high and high SEI, other than the proposed skywalk;

- ▶ Rehabilitate areas that was disturbed with an indigenous species that naturally occur at Gods Window; and
- ▶ Manage the vegetation within the development footprint to maintain it in a natural to near-natural state. The area should not be irrigated.

4.1.2.9 Modification of the natural vegetation

4.1.2.9.1 Nature of impact during construction and operation

As per the 2013 ecological and wetland report, the hydrology of the area seems interconnected and important in terms of regulating different moisture regimes in different areas, many areas serving as habitat harbouring a multitude of species of conservation concern. These species are dependent on the wet conditions of some of the cliffs. The wet conditions of these cliffs are most probably caused by wetlands on the top of the escarpment, and it is therefore likely that disturbance caused to these wetlands will impact the water regimes on the vertical cliffs which will cause the moisture dependant species to die. Construction and operation could cut off the waterflow to plant species of conservation concern growing on the cliff edge and on the vertical cliff.

The current layout destroys most of the *Passerina montana* -*Scleria transvaalensis* scrubveld. Fire in scrubveld maintain the species composition and vegetation structure. Fires will be prevented to safeguard infrastructure, which could result in a change of species composition. Mismanagement of the vegetation and lack of rehabilitation could lead to encroachment by non-herbaceous or 'woody' species such as the bracken fern (*Pteridium aquilinum*) and *Cliffortia linearifolia* which were already present in large numbers. This could change ecotonal communities, which can tolerate fire.

4.1.2.9.2 Mitigation

4.1.2.9.2.1 Planning Phase

Reduce the development footprint within the *Passerina montana* -*Scleria transvaalensis* scrubveld and position the development based on recommendations of the wetland and geo-hydrology assessments.

Consider implementing the development in a phased approach. The impact of the development on the sensitive plant species on the vertical cliffs can not be entirely foreseen or envisaged as it has not been studied. A phased approach (e.g. parking, restaurant and Skybridge as Phase 1) could provide time to study the impact of a smaller development prior to phase 2 of the development (skywalk and additions to the restaurant and visitors centre).

4.1.2.9.2.2 Construction and Operational Phase

- ▶ Leave as much natural vegetation intact as possible;
- ▶ Do not disturbed soil unnecessary;
- ▶ Ensure that areas outside of the operational footprint that were disturbed, are adequately rehabilitated and that dense stands of encroacher species are prevented;
- ▶ All construction materials including fuels and oil should be stored in a demarcated area that is contained within a bunded impermeable surface to avoid spread of any contamination (SEF, 2014);
- ▶ Emergency plans must be in place in case of spillages to prevent contaminants reaching preferential flow paths;
- ▶ Littering and contamination of water sources during construction must be mitigated by effective construction camp management;
- ▶ A fire management plan must be implemented for the duration of construction;

- ▶ Monitor the establishment of dense stands of encroacher species and remove or thin as soon as detected;
- ▶ A rehabilitation plan, using indigenous species from the study area, must be implemented that will restore disturbed areas beyond the footprint of the infrastructure to what it was prior to construction, thereby making the impact on the remainder of the site negligible in the long term;
- ▶ Develop a burning, cutting management plan with an ecologist which considers safety of the operation, local by-laws and national legislation, in order to effectively manage natural vegetation; and
- ▶ Implement a fire management plan that safeguards visitors and infrastructure, while allowing natural fires to burn.

4.1.3 Freshwater Aquatic, Wetland and Riparian Assessment

The impact considerations identified sedimentation, increased erosion, water quality deterioration, increase in alien vegetation species as well as an altered hydrological regime as the major potential impacts during the construction and operational phases. Several preliminary general and specific mitigation measures were proposed in order to reduce negative impacts and incorporate some potentially positive impacts from the proposed tourist facility.

4.1.3.1 Impact: Sedimentation of watercourses

The clearing of natural vegetation and the stripping of topsoil will result in increased runoff of sediment from the site and potentially into watercourses downstream of the study area, particularly during times of high rainfall. Water flowing down trenches and access roads, as well as movement of construction vehicles and personnel, could cause additional sediment to accumulate within downstream watercourses and in severe circumstances potentially impact FEPA Fish support catchments downstream. The potential siltation of watercourses downstream would alter geomorphologic functioning, the movement of water through the system (hydrological functioning) as well as having an impact on water quality within the resource.

4.1.3.1.1 Mitigation – Planning Phase

- ▶ Plan the development footprint to stay well clear of watercourses, particularly Riparian 1. This has been achieved as per the latest lay-out;
- ▶ The design of drainage and stormwater systems for the construction period must ensure there is no sedimentation, eutrophication or erosion of riparian habitat or its associated catchment;
- ▶ It is advised that silt fences and coir logs be installed in areas of expected run-off to collect sediment. The southern and western boundary of the development footprint (downstream side) must therefore be “coir-logged” on contour to force any run-off through these sediment traps; and
- ▶ Keep the development and construction footprint as small as possible through planning various components of construction flow with limited space in mind. Timing, orientation, spatial utilisation and optimisation by appropriate planning throughout the entire construction process, is therefore cardinal.

4.1.3.1.2 Mitigation – Construction Phase

- ▶ An independent ECO should be appointed to oversee construction and appropriately briefed and trained by the freshwater ecologist on all issues pertaining to watercourses and site stormwater management. The ECO should in turn train any new construction staff and or contractors that arrive on site ensuring that all environmental are appropriately considered and managed;
- ▶ As first point of departure it must be ensured that all no-go areas on the perimeter of the footprint is appropriately fenced off before construction are initiated. Coir logs must be installed on this fence line also prior to initiation of construction;

- ▶ Only remove vegetation where necessary and retain vegetation in place for as long as possible prior to removal;
- ▶ Prohibit vehicular or pedestrian access into natural areas beyond the demarcated boundary of the construction area. Ensure this aspect forms part of training;
- ▶ Formalise access roads and make use of existing roads and tracks where feasible, rather than creating new routes through naturally vegetated areas;
- ▶ A vegetation rehabilitation plan should already be implemented during construction to rehabilitate areas that will be affected by edge effects. Such a plan should use indigenous species from the study area and must restore disturbed areas beyond the footprint of the infrastructure to what it was prior to construction, thereby making the impact on the remainder of the site negligible in the long term. Natural colonisation could take a long time, in which vegetation may degrade further or become dominated by encroacher or alien invasive plant species. Therefore, timely rehabilitation is imperative. Even in the event of good rains, annual pioneer plants are short-lived and therefore an effort must be made to keep as many shrubs in place as possible or to replace these as part of rehabilitation;
- ▶ Where topsoil needs to be removed, store such in a separate area where such soils can be protected until they can be re-used for post-construction rehabilitation where applicable. Never mix topsoil with subsoils or other spoil materials;
- ▶ All stockpiles must be protected from erosion, stored for the minimum amount of time necessary and on flat areas where run-off will be minimized, and be surrounded by bunds;
- ▶ If possible, re-position the topsoil stockpile (where relevant) upslope of any infrastructure within the surface infrastructure footprint so as to prevent contaminated surface water coming into contact with topsoil; and
- ▶ The ECO must be vigilant to detect any negative impacts on watercourses and consult with a wetland specialist if erosion, sedimentation or other negative impacts within the vicinity of watercourses are noticed.

4.1.3.2 Impact: Erosion during Construction

The removal of surface vegetation will cause exposed soil conditions where rainfall and high winds can cause mechanical erosion. In addition, hardened surfaces and bare areas are likely to increase surface run off velocities and peak flows received by watercourses.

4.1.3.2.1 Mitigation

- ▶ An ecologically-sound stormwater management plan must be implemented at the onset of the construction phase;
- ▶ A riparian monitoring program should be initiated before the onset of the construction phase. The Environmental Control Officer should be briefed by a wetland / aquatic specialist on specific monitoring issues. An inspection of cleared and disturbed areas as well as any stormwater infrastructure needs to take place after each large rain event. Appropriate mitigation needs to be implemented after consultation with relevant specialist if any problems are detected;
- ▶ Erosion must not be allowed to develop on a large scale before effecting repairs;
- ▶ All areas susceptible to erosion must be protected and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas;
- ▶ Natural trees, shrubbery and grass species must be retained wherever possible;
- ▶ Areas exposed to erosion due to construction should be vegetated with species naturally occurring in the area;
- ▶ Surface water or storm water must not be allowed to concentrate, or flow down cut or fill slopes without erosion protection measures being in place; and
- ▶ The incorporation of Sustainable Drainage Systems (SuDS) as well as Water Sensitive Urban Design (WSUD) (e.g. permeable pavements, alignment/orientation of roads, etc.) within the layout planning and design is required to reduce runoff from the site.

4.1.3.3 Impact: Alien Invasive Vegetation during Construction

During construction, vegetation will be removed and soil disturbed. The seed of alien invasive species that occur on and in the vicinity of the construction area could spread into the disturbed and stockpiled soil. In addition, the construction vehicles and equipment were likely used on various other sites and could introduce alien invasive plant seeds or indigenous plants not belonging to this vegetation unit to the construction site. Alien vegetation could easily disperse into the watercourses through stormwater infrastructure located on site.

4.1.3.3.1 Mitigation

- ▶ All protocols and mitigation measures as recommended by Dimela (2022) pertaining vegetation and alien invasive species control must be implemented;
- ▶ During construction, the construction area and immediate surroundings should be monitored regularly for emergent invasive vegetation;
- ▶ Surrounding natural vegetation should not be disturbed to minimize chances of invasion by alien vegetation;
- ▶ All alien seedlings and saplings must be removed as they become evident for the duration of construction and operational phase;
- ▶ Manual / mechanical removal is preferred to chemical control;
- ▶ All construction vehicles and equipment, as well as construction material should be free of plant material. Therefore, all equipment and vehicles should be thoroughly cleaned prior to access on to the construction site. This should be verified by the ECO; and
- ▶ An alien invasive eradication and monitoring plan must be compiled and implemented whereby all emergent invasive species are removed during construction. The monitoring plan must also ensure that the re-emergence of invasive species is monitored continuously during the operational and decommissioning phases and that monitoring and eradication continues post decommissioning.

4.1.3.3.2 Mitigation – Operational Phase

Impacts described in the construction phase are in most instances also applicable to the operational phase.

4.1.3.4 Impact: Altered Hydrological Regime during Operation

The clearing of natural vegetation with high basal cover and subsequent replacement with hardened surfaces and other infrastructure including an increase of access roads and other compacted areas as well as roofs are likely to result in increased run-off, especially peak flow velocities received by watercourses and potential recharge areas. The hydrology of the area seems interconnected and important in terms of regulating different moisture regimes in different areas, many areas serving as habitat harbouring a multitude of species of conservation concern. Lateral water movement seems likely to be an important component of the geohydrology of the area with potential groundwater-fed headwaters occurring in several locations within and surrounding the study area. Large foundations and or cut and fill or blasting operations could have a significant impact on subsurface flows. Further, albeit likely to be a very minor impact, the building itself could result in changes to the orthographic generated precipitation process and patterns, especially mist, on the escarpment edge.

4.1.3.4.1 Mitigation

- ▶ The construction of foundations for the new tourist facility could potentially intercept surface water flows, a perched aquifer and or other water-bearing geological features leading to desiccation of wetland and other sensitive habitats, especially cliff edges and headwaters of riparian habitat. However, latest results from geotechnical and hydrogeological modelling indicates that the main hydrological mechanisms in the vicinity of the footprint of the proposed development is suggested

to be more surface flow orientated. A conservative and precautionary approach in the design has been taken already, including limitation of impermeable surfaces as well as roof top indigenous gardens with sub-infrastructure drainage linked to the foundation via pillar drainage, thereby significantly reducing potential impacts on surface and subsurface drainage and daylighting hydrological regimes. Thus, rainwater from the building roof will be released into the environment in a controlled manner to also encourage recharging of the potential sub-surface flows. The development hydrology will thus mimic the site's hydrogeology (filling and spilling) though allowing water to potentially recharge through cracks underneath the foundation with excess overflow directed towards Riparian 1 for further attenuation and diffuse release;

- ▶ New parking to be laid with permeable block paving. Rainwater will infiltrate through the permeable concrete blocks into a sub-base comprising of stone layers and will encourage recharging of the sub-surface flow. Rainwater which does not infiltrate through the paving blocks will run overland and will be channelled into a stormwater attenuation pond. Stormwater discharged from the attenuation pond into the natural environment in a controlled manner to not exceed the pre-development peak flows, which will also encourage recharging of the sub-surface flow;
- ▶ The incorporation of Sustainable Drainage Systems (SuDS) as well as Water Sensitive Urban Design (WSUD) (e.g. permeable pavements, alignment/orientation of roads, etc.) within the layout planning and design is required to decrease runoff from the site during rainfall periods;
- ▶ Implement an ecologically-sensitive stormwater management plan that includes not allowing stormwater to be discharged directly into regional stormwater systems but rather be attenuated on site through attenuation facilities with diffuse release infrastructure; and
- ▶ It should be investigated through the ARC what temporary weather station monitoring programs and equipment would be necessitated to determine baseline and monitor precipitation regimes pre and post development and whether such endeavours could be done cost effectively.

4.1.3.5 Impact: Water Quality Deterioration during Operation

Hydrocarbon-based fuels or lubricants spilled from construction vehicles, construction materials and litter deposited by construction workers may be washed into drainage lines and wetlands. The mobilisation of sediments, excavations, removal and disturbances to vegetation, mobilisation of hydrocarbon and other compounds could have various negative impacts on wetland/riparian areas and their associated functionality. Should appropriate toilet facilities not be provided for construction workers at the construction crew camps, the potential exists for surface water resources and surroundings to be contaminated by raw sewage. Operational impacts on water quality include discharge of inappropriately treated sewage effluent, spillages of chemicals and or cleaning agents utilised for maintenance purposes.

4.1.3.5.1 Mitigation – Construction Phase

- ▶ Construction vehicles are to be maintained in good working order so as to reduce the probability of leakage of fuels and lubricants;
- ▶ A walled concrete platform, dedicated store with adequate flooring or bermed area should be used to accommodate chemicals such as fuel, oil, paint, herbicide and insecticides, as appropriate, in well-ventilated areas;
- ▶ Storage of potentially hazardous materials should take place far away from preferential flow paths and or stormwater infrastructure. These materials include fuel, oil, cement, bitumen etc.;
- ▶ Surface water draining off contaminated areas containing oil and petrol would need to be channelled towards a sump which will separate these chemicals and oils;
- ▶ Concrete is to be mixed on mixing trays only, not on exposed soil;
- ▶ Concrete and tar shall be mixed only in areas which have been specially demarcated for this purpose;
- ▶ After all the concrete / tar mixing is complete all waste concrete / tar shall be removed from the batching area and disposed of at an approved dumpsite;

- ▶ Stormwater shall not be allowed to flow through the batching area. Cement sediment shall be removed from time to time and disposed of in a manner as instructed by the Consulting Engineer;
- ▶ All construction materials liable to spillage are to be stored in appropriate structures with impermeable flooring;
- ▶ Portable septic toilets are to be provided and maintained for construction crews, and are to be located at least 100m from designated buffer zones. Maintenance must include their removal without sewage spillage;
- ▶ No uncontrolled discharges from the construction crew camps to any surface water resources shall be permitted. Any discharge points need to be approved by the relevant authority;
- ▶ In the case of pollution of any surface or groundwater, the Regional Representative of the Department of Water and Sanitation must be informed immediately;
- ▶ Provide bins for construction workers and staff at appropriate locations, particularly where food is consumed;
- ▶ The construction site should be cleaned daily and litter removed; and
- ▶ Conduct ongoing staff awareness programs so as to reinforce the need to avoid littering.

4.1.3.5.2 Mitigation – Operation Phase

- ▶ Appropriate backup and fail systems should be built into the design of the sewage treatment works to prevent any spillages into the downstream environment;
- ▶ Rehabilitation of Riparian 1 should include attenuation, infiltration and diffuse release mechanisms which can promote artificial wetland conditions capable of polishing stormwater and or treated sewage effluent. The upper most attenuation facility should be lined and act as a last fail save to prevent any effluent that does not meet the DWS determined discharge qualities to be kept temporarily (either pumped back into treatment works for further treatment or pumped to honey sucker; and
- ▶ Pressurised water should be utilised as far as possible rather than any chemicals. Only bio-friendly cleaning agents should be utilised as last necessity where required.

4.1.4 Hydropedology Assessment

Hydropedology is the relatively new, interdisciplinary research field which focuses on the interactive relationship between soils and water. At the proposed site, the dominant flowpath and source for the riparian areas is overland flow. Therefore, water will flow into the drainage channels during a rainfall event and exit the system through the channels. Soils classified as recharge are limited, and therefore, the areas recharging the cracks and fissures of the cliff face are most likely further away from the cliff façade. To predict the recharge areas more accurately, an isotope study could determine the residence time of the water exiting the cliff façade. This can then be linked to areas further away. The broader studies would not change the recommendations made towards the construction and building, and the functioning of the wetlands.

The road has most likely cut off the recharge flowpath through the weathered rock to Riparian 1. Therefore, there is an opportunity for the development to replace the loss of more constant source of water caused by the road, by having an attenuation pond into Riparian 1. It will be important to calculate the hydraulic properties of the soils around the attenuation pond to calculate the rates of water release.

The Structural Engineering mitigating measures to address the concerns of infiltration into the cracks that support the surrounding environment are as follows:

- ▶ The natural balance between surface water and water beneath the ground will be mimicked in the building design. Above the roof slab, water will naturally find its way through the soil for the Scrubveld into an engineered layer below, which will be designed to attenuate the rainwater from above. This will slowly drain to pipes in the supporting columns down into a drainage system

below the ground slab. From here the rainwater will either recharge the ground water that naturally percolates into the fissured rocks feeding the escarpment or it will be stored on site; and

- Foundations will be single, isolated bases directly beneath each column. This design will minimise the impact on the fissured rock and the natural water flow.

The current natural flowpaths can be mimicked and the impact of the project could improve the current conditions of the riparian at the site. This can be achieved by calculating or modelling the current surface runoff, which can be mimicked after construction and released back into the riparian zone. It would be important to model different scenarios of rainfall events that can occur to simulate the volumes that the engineering component would need to incorporate. It is important that the riparian zone been kept wet at the current conditions, as this is likely a source of water for cracks that feed plants on the façade. The runoff from the car park be used as this mechanism is very similar to the current conditions.

4.2 Initial Obstacle Limitation Surface (OLS) Assessment

The high-level concept OLS assessments indicated that the land use development on the proposed God's Window Skywalk Project will not cause any anticipated protrusions on the OLS of the identifies airfields. Findings from the Web-based National Screening Tool indicates high sensitivity feature of the development in relation to identified airfields. The OLS assessment conducted however, indicates no interaction between the proposed development and the OSL of the identified airfields.

This analysis does not include Air Traffic Navigation Services (ATNS) requirements or radar interference considerations. If deemed necessary by the Civil Aviation Authorities (CAA), the developer should approach ATNS directly for the related evaluation.

4.3 Agricultural Statement

God's Window site is in mountainous land and confined to a small area between the road and the cliff. Plantation forestry occurs on the other side of the road. The site has no potential for agricultural production. The entire site should be classified as low agricultural sensitivity because it has no practically achievable agricultural production potential. The fine-scale agricultural sensitivity of the site, as identified by the screening tool, is therefore disputed by this assessment.

4.4 Archaeological and Heritage Impact Assessment

The Heritage Impact Assessment (Phase 1) concluded that no archaeological / heritage features of significance or graves were identified in the project area, and from an archaeological and heritage perspective. Archaeological material or graves are not always visible during a field survey and therefore some significant material may only be revealed during construction activities. It is therefore recommended that the developers be made aware of this possibility and when human remains, clay or ceramic pottery etc. are observed, a qualified archaeologist must be notified, and an assessment be done. Further research might be necessary in this regard for which the developer will be responsible.

In terms of the Palaeontological Impact Assessment, it is extremely unlikely that any fossils would be preserved in the quartzites of the Wolkberg Group or the soils of the Quaternary. The surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are much too old to contain body fossils. Since there is an extremely small chance that trace fossils such as stromatolites were present and may be disturbed a Fossil Chance Find Protocol has been incorporated into this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low. The Fossil Chance Find Protocol describe the procedure to be adopted in the event that heritage resources are identified during construction, this procedure is included as Appendix B.

4.5 Traffic Impact Assessment

The proposed development is expected to attract 1 089 visitors and 161 employees per day. On this basis, the proposed development is expected to generate about 60 vehicle trips during peak hour of a normal day that does not fall in December or long weekend which are considered to be abnormal days. The existing development generates an average of 78 vehicle trips per hour on a normal day, based on a traffic count that was done on a Friday and a Saturday in June 2020. June falls on the shoulder season between peak and off-peak months at the development, therefore, considered to provide average demand at the existing development for a year.

Since the proposed development peak hour volumes were found to be less than the existing average demand, a sensitivity analysis was conducted to test a wide range of scenarios pertaining to the traffic volumes generated by the proposed development. The scenarios included the following:

- Low growth scenario – No additional trips are generated at the proposed development;
- Medium growth scenario- The proposed development will attract a magnitude of additional trips that is equivalent to 50 % of the current trips at the site; and
- High growth scenario- The proposed development will attract a magnitude of additional trips that is equivalent to 100 % of the current trips at the site
- For normal days, the capacity analysis indicated that all intersections in the study area are currently operating at an acceptable level of service and will continue to operate acceptably in the future for all proposed development growth scenarios tested;
- For Abnormal days, except for the intersection of Main Street and R532 and Richardson Avenue in Gaskop, all intersections in the study area are operating at an acceptable level of service and are expected to continue to operate at a similar level of service in the future for all growth scenarios tested;
- The intersection Main Street and R532 and Richardson Avenue is currently operating at an unacceptable level of service during abnormal days and will worsen in the future if not signalised. It is the local municipality's responsibility to upgrade roads to accommodate existing traffic demand and traffic background growth. However, it should be noted that the frequency of abnormal days is far less than normal days and signalization of the intersection may be deemed not necessary;
- The existing access off the R534 will be used and will require no additional road upgrades as the existing capacity is expected to accommodate all future growth scenarios tested;
- As per the proposed entrance layout, the development will have two inbound lanes and two outbound lanes at the access. The queuing analysis results at the access indicated two inbound lanes and two outbound lanes would be adequate for normal days for all growth scenarios tested. The medium and high growth scenarios for abnormal days would require 3 and 4 inbound lanes, respectively. The proposed two inbound lane would be able to handle about 15% development growth of the existing abnormal day demand;
- For the ease of movement of the public transport vehicles to conduct drop offs and pick-ups, it is recommended that there be two inbound lanes into the site, from the intersection of the development access with R534, whereby one will be for public transport vehicles and the other for light vehicles entering their designated parking areas; and
- To promote a safe environment for NMT users, a 2m wide sidewalk is recommended along the development frontage. It is also recommended that separate gates for NMT users be provided at a convenient location, at the development access.

4.6 Landscape and Visual Impact Assessment

Key impacts identified during the landscape and visual assessment were:

- ▶ Impact on landscape character and sense of place;
- ▶ Impact on visual intrusion and visual absorption capacity (VAC);
- ▶ Impact as a result of visual exposure and visibility impacts; and

- ▶ Impacts due to night-time lighting.

4.6.1 Mitigation -Pre-construction

- ▶ Install low level lighting or limit mounting heights of lighting fixtures by utilising footlight or bollard level lights. The use of high light masts and high pole top security lighting should be avoided along the security fence of infrastructure areas. Any high-level masts should be covered to reduce glow and light spillage;
- ▶ Use minimum lumen or wattage in light fixtures, where possible and practical;
- ▶ Up lighting of structures must be avoided where possible, with lighting installed downward angles that provide precisely directed illumination beyond the immediate surroundings of the infrastructure, thereby minimising the light spill and trespass;
- ▶ Steel roof sheets must be a dark colour such as khaki brown, grey brown or olive green;
- ▶ All structures must have “full cut off” light fixtures that direct light only below the horizontal;
- ▶ Use low pressure sodium lamps, yellow Light Emitting Diode (LED) lighting, or equivalent to reduce sky glow. (Bluish white lighting is more likely to cause glare); and
- ▶ Make use of motion detectors on security lighting at operations and/or maintenance type buildings.

4.6.2 Mitigation - Construction and operation

- ▶ Locate the construction camps in areas that are already disturbed or where it is not necessary to remove established vegetation;
- ▶ Utilise the existing screening capacity of the site and improve it by enclosing the construction site and stockyards with a dark green or khaki brown shade cloth which are at least 3m high, as an additional screen;
- ▶ Exposed soil (carpark area) must be covered or 'camouflaged' using a biodegradable soil mat and vegetation cover to reduce the duration of visible scarring of the landscape;
- ▶ Retain the existing vegetation cover of the site through selective clearing, where practical;
- ▶ Dust suppression techniques should be implemented especially on windy days, preferably using biodegradable binding agent;
- ▶ Remove rubble and other construction rubbish off site as soon as possible or place it in containers in order to keep the construction site free from additional unsightly elements;
- ▶ Keep the construction sites and camps neat, clean and organised in order to portray a tidy appearance;
- ▶ Monitor all areas for rehabilitation failure and implement remedial action immediately; and
- ▶ Buildings should not be allowed to fall in disrepair, damage to structures and maintenance to infrastructure should be carried out timeously and regularly as required.

4.7 Social Impact Assessment

Based on an impact evaluation it was determined that there are likely 28 social impacts that could material in the socio-economic landscape. Although most stakeholders expect the project to have a positive economic impact in the area, many other stakeholders are cautiously optimistic. The project might have the opposite effect, it might draw tourists out of Graskop, decreasing the per capita spend, or there could be an unfair spread in benefits as perceived by the public. Curio vendors will be impacted during the construction phase but will probably benefit in the long-term. The project impacts might have a cumulative impact if factoring in the current low unemployment rate, the impact that COVID-19 has had on many small businesses in the area, and the fatigue experienced by many stakeholders due to the project's delay since circa 2013. It is worth noting that although the project will likely have a net positive impact by creating some job opportunities and upliftment in the local communities, all of these changes take place within a larger milieu where the project is looked at as a benefactor that can provide more than it actually can.

Key impacts determined during the assessment as well as recommended mitigation measures are summarised in Table 6 below.

Table 6: Summary of social impacts and recommended mitigation measures

| PROJECT PHASE | IMPACT | IMPACT DESCRIPTION | MITIGATION MEASURE |
|---------------|--|---|---|
| Construction | Livelihood impact on curio vendors | During the construction phase, it is quite likely that curio stalls around the parking lot will have to close due to safety risks and there being no tourists visiting the site. This will result in the loss of an income source for many of the vendors in the area, as well as their households who depend on the income. | Temporary relocation of stalls to other sites such as Wonderview and granting of permits to them to sell at other sites. Temporarily selling at other sites may cause further complications such as transport of goods, structures to sell under, safety, sufficient customers as well as competition with possible existing vendors at particular sites. Some curio vendors could also be given temporary jobs at the construction site. |
| Operation | Expectation of job opportunities | Expectation of job opportunities raised due to the low unemployment rate. In some cases, long-term job opportunities are expected, and temporary, construction-related jobs are regarded as inferior. This expectation was raised by various stakeholders, including Tribal Councils who expect people under the Tribal Authorities to be first in line for job opportunities. | Number, type, duration and nature of available jobs, and criteria to apply for jobs must be well-publicised through appropriate communication channels well before job applications open. Key stakeholders are to be informed of job opportunities via diverse channels, but from a single, reliable source to ensure that the expectation for jobs does not live on through unreliable information sources. Spatial-or affiliation-based preference in terms of jobs should be very clear and justifiable. This means that residents of the relevant Local Municipalities (sensitivity was raised if only Ward 9 and/or 10 would benefit) or those under one of the eight chieftaincies need to understand how opportunities are to be distributed. |
| Construction | Delays in project progress during construction, and subsequent delays in opening caused by disruption/community unrest | Disruption to site activities, traffic, and nearby activities in town if not enough information provided, inadequate job or procurement opportunities or other benefits. If site activities are disrupted, it can lead to delays during the construction phase such that the opening date (start of operational phase) is delayed. | Consistent communication and dissemination of information to stakeholders must take place. In addition, TCLM law enforcement and SAPS should be made aware of potential disruption. Building a relationship with them and placing them on high alert if such activities are imminent at any phase of the project is key. This could prevent or at least reduce the time or the extent of the disruption. |
| Construction | Impacts on sacred areas or areas with heritage, cultural, or religious significance | Although no sacred areas were identified during consultations, a slight possibility exists that heritage finds might occur during construction activities. | Implementation of chance heritage finds procedure during construction; toolbox talks during construction with examples and pictures. |
| Operation | Increased business for mini-bus taxis as mini-tour buses or transport for curio vendors | Local taxi associations might benefit from the development if it is used as a platform from which to market mini tours of the Panorama route, departing from the Skywalk. Additional business might be available to taxis if transport can be provided to curio vendors between Graskop (home) and the Skywalk. This will also provide a reliable form of transportation to curio vendors, who currently struggle with it on peak-days. | Since the impact is positive, no mitigation is envisaged. However, the initiatives suggested should be workshopped with taxi associations and potentially owners, so that they are aware of the stringent safety requirements that will be expected in such an operation by the developer/investor. It must be made very clear what the benefits of roadworthiness and other standards are. |
| Operation | Increased traffic and discomfort between mini-bus taxis and between taxis and tourist buses | The three local taxi associations (Sabie, Graskop and Bushbuckridge Taxi Associations) are concerned that they might lose out financially if they are charged for entrance or cannot gain entrance to the development to drop off and pick up | Taxi associations can be informed with relative ease on the planned entrance charges, namely that none are envisaged for buses and taxis and that there will be drop-off spaces. However, the number of drop-off spaces needs to be very clearly defined to ensure that there are no undue |

| PROJECT PHASE | IMPACT | IMPACT DESCRIPTION | MITIGATION MEASURE |
|---------------|--|--|--|
| | | passengers. Instead, they expect to benefit from the development through increased passenger turnover. Unmanaged expectations on the number of taxis that can stop at the development and for how long might exist, since taxis wait to fill up before they depart. This might cause additional traffic impacts or discomfort between mini-bus taxis and large tourist bus operators. | expectations as to the number of taxis that can stop at the development and for how long. This will have to be based on a projected potential number of increased visitors, so that the motivation for all decisions made is clear to all stakeholders. |
| Operation | Expected increased sales and benefits for all curio vendors, not just those currently at God's Window and increased competition. | Curio vendors from other sites (such as the Pinnacle, Lowveld View and Wonderview) coming to the development could create competition at the site. | Workshop potential benefits and limitations on number of allowable stalls (to be confirmed during detailed design phase) with the curio sellers. Liaise with MTPA to improve marketing of entire Panorama route to reduce competition and to provide improved protection from theft and inclement weather at other sites. Open "recruitment" process could also be considered, with a weighted scoring system where preference is given to current God's Window curio vendors and the quality and uniqueness of the product to ensure variety. Workshopping will also provide a platform to gauge the appetite for changing or diversifying the articles sold. A further enhancement could be alternative skills development and the creation of diversified income streams. From the acquisition of new skills and community-based projects, curio vendors can supplement their income with new forms of revenue. |
| Operation | Prioritisation of God's Window Skywalk by tourists might reduce business elsewhere. | If more tourists are attracted to the Skywalk, it is feared by many stakeholders (including curio vendors and local business owners) that fewer people will support them, as they would rather spend time and money at the Skywalk. | Engage TCLM and/or DBSA to improve attractiveness of town and road conditions in Graskop. Engage MTPA to develop day-tours from the Skywalk (currently, a day pass is regarded not justified due to a lack of activity). Use Skywalk as a platform to market local businesses and other points on the Panorama route. Collaborate with other local businesses that provide activities in the area. Provide information on projected increase in visitors to area (as opposed to reduced spend per capita). |
| Operation | Increased security and protection from theft and inclement weather for curio vendors | If curio vendors who are currently selling wares at God's Window can now sell it inside the new development, they will be afforded more protection from the theft of their stock, as the current security measures are thought to be inadequate. Inclement weather also affects the current stalls, so the newly constructed development would provide improved roofing, waterproofing and other elements of more sound buildings. | The new God's Window Skywalk will provide an area for local curio vendors with better security, visibility and protection from the elements. No mitigation is therefore needed, but positive impacts can be enhanced by workshopping further preferences with curio vendors to ensure that any other as-yet unknown negative current circumstances can be mitigated. |
| Operation | Litter, destruction and nuisance | Curio vendors, Graskop businesses and ward committee members are concerned that the new development will lead to increase litter at God's Window, compounded by increased noise and nuisance due to the increase in movement. | Onsite security and fines could be implemented as litter prevention measure (especially tossing litter into unreachable places) as in the case of the Gautrain, where eating is prohibited, and persons can be fined if they do. Site to be regularly cleaned, potentially using a local cleaning company. Local cleanliness custodians or tour guides can also be trained and appointed to ensure that littering is prevented. Publicly available |

| PROJECT PHASE | IMPACT | IMPACT DESCRIPTION | MITIGATION MEASURE |
|---------------|---|---|--|
| | | | information (such as during legislated Public Participation Process) to show why the need for a noise impact assessment was excluded from specialist studies, as well as the litter prevention measures that will be put in place. The anticipated noise impacts should be placed in context of existing noise generated by, for instance, truck in the area. |
| Operation | Curio vendors might lose more money than they make if they have to pay rent at the new development | Curio vendors expressed fear that new stall sizes might be inadequate, that they might be awkwardly laid out, that they might not be visible, and they might be charged unreasonable amounts to rent stalls inside the new development, which will lead to decreased net income for them. This impact will be felt especially during low or off-peak seasons. | Census of each curio seller's space requirements to gauge typical sizes needed. Develop various space options available for rent based on census outcome (with closer-to-ideal display and storage areas, and no partitions between vendors if corresponding with census results). Locate curio market right after entrance area(s) to increase visibility. Clear communication on benefits to having a stall inside despite the rental charge (improved display area, security, weatherproof stall, etc.). Workshop potential options for rental payments (e.g., stall size or turnover-based, or a weighted combination) with curio sellers (rental rates are still undetermined and the final number of available stalls will depend on this). |
| Construction | Lack of involvement of local SMMEs during the operation phase could lead to project disruption and poor Social Licence to Operate | A local business chamber that represents various local business forums expressed a desire to benefit from the project and indicated potential disruption to the project in the absence thereof. | Liaise with local business forums on what skills and expertise local SMMEs could provide. Very clear communication/ information dissemination on the number, type, duration and nature of available business opportunities, and criteria (e.g., safety requirements and price requirements) to apply for contracts must be well-publicised through appropriate communication channels well before the construction phase commences to manage expectations. Enterprise development could take place through business finance training, online marketing to increase visibility to international tourists who plan their holidays based on what they see online, registration of businesses, etc. This could assist enterprises who are not able to provide goods or services to the proposed project. These options could be discussed during workshops, during which the fact that quality cannot be compromised on as, the higher the quality (and compliance) of the product/service and integrity of the company, the better the chances of attracting business opportunities from other clients as well, and not only the Skywalk. |
| Construction | Unfair distribution of employment opportunities | (Fear that) local employment/business opportunity distribution might be manipulated by "business forums/political interference/land claimants" such that the people who need it most will not benefit. This could lead to delays, and unfair benefit-, job-, and opportunity-distribution (and protest action). | The applicant must ensure that very targeted messaging on the role of CPAs (the importance of the Blyde 04 CPA body in the land claims process), tribal history, status on progress of land claims (restitution), and land ownership is distributed ongoing. The limitations to the number of jobs created and opportunities available must be timeously communicated publicly - if a 40:60 split exists between land claim beneficiaries vs rest of South Africa in terms of legislation of Protected |

| PROJECT PHASE | IMPACT | IMPACT DESCRIPTION | MITIGATION MEASURE |
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| | | | Areas, this can be justified with relative ease. Targeted messaging on the benefits of the project and the Private Public Partnership (PPP) for co-management between MTPA and the Blyde 04 CPA must be developed and disseminated, as well as targeted communication and messaging on the project's "story" over time. Engage relevant stakeholders/officials within Local Municipalities regularly to ensure that the same understanding is reached. TCLM to be duly informed on project developments at different times. At the time of writing the SIA, it was reported that conversations with TCLM officials were imminent, and that LED and councillor engagements commenced. Information on how contracts are awarded; dividends; job applicant requirements; etc. must also be provided when the 30-day public participation period commences. |
| Construction | Increased traffic during construction phase around God's Window and in Graskop | Trucks and other construction related vehicles will increase traffic on the road passing God's Window, subsequently affecting Graskop town. Although it is not envisaged that construction will have significant impacts on adjacent landowners, there may be minor impacts such as increased traffic on shared roads due to construction. | Findings and mitigations of increased traffic (outcomes of the Traffic Impact Assessment [TIA]) should be included in the Public Participation Process and communications done by the Applicant. Public notifications of start-dates of construction (and therefore increased traffic) must be communicated by the Applicant. Consultation with Local or District traffic authorities is key to ensure that the necessary support and diversions, if necessary, are provided. There should be clear communication with adjacent landowners to provide regular updates on project progress and what is to be expected. |
| Operation | Increased traffic around site and in Graskop during peak holiday periods | Visitors to the Skywalk might park along the side of the road, as it is alleged that "people are reluctant to pay for parking". This could lead to increased traffic on site as well as in the town of Graskop. There may be a significantly greater number of tourists visiting the site in any case, impacting traffic on shared roads. This could be a positive impact if it leads to more time being spent in Graskop, thereby increasing the chances of more local spend. | Findings and mitigations of increased traffic (outcomes of the Traffic Impact Assessment [TIA]) should be included in the Public Participation Process and communications done by the Applicant. Consultation with Local or District traffic authorities is key to ensure that the necessary support and diversions, if necessary, are provided. There should be clear communication with adjacent landowners to provide regular updates on project progress and what is to be expected. |
| Construction | Reduced spend in Graskop during construction of Skywalk caused by fewer visitors | Closure during construction might cause a dip in visitors to Graskop and the income to MTPA will be impacted. | Market Wonder View as alternative lookout in interim – timeously provide information on internet. Engage MTPA to promote/market/enhance Panorama route and Wonder View. Virtual Reality platform at God's Window. Keep hiking trails open (to be determined if possible). |
| Operation | Safety of Skywalk structure | Stakeholders are concerned about the safety of the structure itself and of the Skywalk on misty days. | Include safety measures in FAQ leaflet, such as closure of Skywalk on days or during times of low visibility, and safety of structure and facilities by making engineering/structural designs for safety approachable in information pieces, public participation process etc. |

| PROJECT PHASE | IMPACT | IMPACT DESCRIPTION | MITIGATION MEASURE |
|---------------|--|---|---|
| Operation | Current emergency services might not be able to handle emergencies if they occur on site. | Current emergency and disaster services might not be able to handle emergencies if they occur on site. Some stakeholders are concerned particularly about the safety of people who have consumed alcohol. | Engage TCLM Emergency Services & Safety Directorate on Disaster Management and Emergency Services (incl. fire) on capacity for search and rescue, evacuation, medical emergencies etc. Include emergency and safety measures of development in FAQ. Include emergency and disaster management discussions in engagements with TCLM when discussions are held on bulk and spatial planning. Reach out to District if TCLM services are not up to standard. |
| Construction | Impacts on current water sources | It is alleged that the current water sources available in the area are already being used to full capacity. Furthermore, it is feared that wetlands will be affected as boreholes (or similar) are drilled during or prior to construction. | Engage TCLM/IDP to determine state of water, find alternative water sources. Include water-focused (section in) an FAQ or information piece developed by the Applicant on the fact that water might be sourced from boreholes, whether the search for water sources has been successful thus far, how much water will be needed during construction and operation, what the expected yield from these boreholes is anticipated, whether it is adequate and if not, how it will be supplemented, whether the necessary authorisations are in place, how wetlands will be protected (if at all present), where sewage will be pumped to, how much will be generated and how it will be treated. |
| Operation | Land claim beneficiaries might not benefit from the Skywalk as expected, leading to frustration with certain leadership structures | Beneficiaries who are not in regular contact with CPA land claimant representatives or the Blyde 04 CPA-board members want to know when and if they will ever benefit from any initiatives that the CPAs are involved in. This stems from an expectation that might have existed when the project was due to start some years ago. There might also be misinformation or a lack of information, as no benefits have as yet accrued from any developments since the land claims process commenced. | It is key to involve the CPAs in all public meetings, focus groups, workshops or any other public engagements. Clear messaging must be developed to clarify the role of the CPAs and the benefit structure to land claimants, beneficiaries and the local community as it falls under Wards, Tribal Authorities, within and outside of the beneficiary register. |
| Construction | Vulnerable groups might be left behind | Vulnerable groups, such as the elderly, disabled, illiterate, and women, might feel "left" behind in the project, as they do not have access to or understand the information that is available as part of this project. They might also not be reachable to disseminate information, further robbing denying the opportunity to contribute to or at least understanding the nature of the project and how it could benefit them, albeit indirectly. | Provide FAQ / information in easily disseminable and understandable format and using the communication channels preferred by these groups. Translate all documents to Sepulana (or Sepedi). Proactive, in-person communication (such as meetings) is better than passive, one-way communication (such as SMSs, posters, newspaper ads, etc.) to ensure that these stakeholders are reached. |
| Construction | Environmental impact of development on "pristine" God's Window site. | Numerous stakeholders are concerned that the project will have an irreversible environmental impact on the God's Window site. Concerns on impacts on indigenous or endemic vegetation, fauna, wetlands, heritage, and water were raised on various occasions. | Various environmental mitigation measures have been developed by specialists and are listed in the EMPr that must be used in both the construction and operation phases of the project. The contractor and their sub-contractors must be very clear on the sensitive natural area they work in - the temporal nature of the "construction phase" does not mean that natural impacts are less severe. Understandable toolbox talks must be |

| PROJECT PHASE | IMPACT | IMPACT DESCRIPTION | MITIGATION MEASURE |
|---------------|---|--|---|
| | | | done with construction workers. Environmental auditing should be included in the conditions to the Environmental Authorisation and the EMPr included in the contractor's Terms of Reference. |
| Operation | Environmental impact of development on "pristine" God's Window site. | Numerous stakeholders are concerned that the project will have an irreversible environmental impact on the God's Window site. Concerns on impacts on indigenous or endemic vegetation, fauna, wetlands, heritage, and water were raised on various occasions. | Various environmental mitigation measures have been developed by specialists and are listed in the EMPr that must be used in both the construction and operation phases of the project. The employees and companies that will work at the Skywalk (and the visitors thereto) must be very clear on the sensitive natural area they are in. Understandable induction must be done with workers. Environmental auditing should be included in the conditions to the Environmental Authorisation and the EMPr included in the Terms of Reference of companies who conduct business at the Skywalk. |
| Operation | Socio-economic benefits of the Project might not be felt by all who expect it. | Local farmers expect sponsorship, marketing and business growth assistance from the project. | Procuring fresh produce from local farmers or providing space from them to sell their produce at Skywalk could be recommended, but the feasibility thereof would have to be investigated during more advanced project planning stages. Again, it is very important that, if there is no direct benefit to be had by certain stakeholder groups, this will have to be communicated timeously, along with a breakdown of exactly what the limitation is on any opportunities for business or value-add that might come from the Project. |
| Operation | Tourists targeted by criminals | International tourists might be targeted by criminals, making the site less popular and lucrative. | Engage SAPS, TCLM law enforcement, and private security at Skywalk and surrounds |
| Operation | Some Tribal Councils expect to benefit and receive favourable preferential treatment from the project | Tribal councils expressed a desire to receive an annual benefit from the project much like the dividends that might accrue to the land claimants based on their partnership with MTPA. The councils also feel that those under their jurisdictions should be first in line for job opportunities and not be charged entrance fees. If not appropriately mitigated and managed continuously, this might lead to project delays or stoppages of future projects associated with the Applicant. | Clear, defensible narrative (key message) on why land claimants should receive 60% of all opportunities (as opposed to those under tribal leadership). Regular engagement with the Tribal Councils by the Applicant is necessary to ensure that they are well-informed and versed on the process. Determine how additional benefits could impact the larger community. |
| Construction | Social concomitants associated with demographic impacts | Social ills associated with construction-related in-migration include the spread of HIV/AIDS, teenage pregnancies, and prostitution. | Clear upfront communication on the number and type of jobs will have to be communicated at least two months before construction starts. Information on sexual health could be provided by the contractor as ongoing communication or Toolbox Talks. TCLM law enforcement and SAPS should be made aware of potential influx of job seekers or employees. Engagement with the TCLM is also key to inform them of the presence of any construction workers that would have an impact on the local infrastructure, if applicable. |

| PROJECT PHASE | IMPACT | IMPACT DESCRIPTION | MITIGATION MEASURE |
|---------------|---------------------|--|---|
| Construction | Demographic impacts | Influx of construction workers, job-seekers near the construction site, and spread of informal settlements near the construction site. | Clear upfront communication on the number and type of jobs, as well as the channel through which applications are to be done are key information that will have to be communicated at least two months before construction starts. TCLM law enforcement and SAPS should be made aware of potential squatting. Engagement with the TCLM is also key to inform them of the presence of any construction workers that would have an impact on the local infrastructure, if applicable. |

5 SUMMARY OF IMPACTS AND ASSOCIATED MITIGATION MEASURES

The following tables covers the construction activities and associated environmental impacts that will occur during the proposed project.

The tables consider the expected impacts on-site during the different phases of the project, as well as the mitigation measures and environmental management procedures required to effectively manage the expected impacts. The following sections are dealt with in the table:

- Section 6 : Pre-construction and construction site environmental management
- Section 7 : Materials
- Section 8 : Waste
- Section 9 : Surrounding properties
- Section 10 : Flora, fauna, air quality, noise, water and other
- Section 11 : Rehabilitation
- Section 12 : Planning and engineering considerations

6 PRE-CONSTRUCTION AND CONSTRUCTION SITE ENVIRONMENTAL MANAGEMENT

Table 7: Pre-construction and construction site environmental management

| ACTIVITY | ASPECT | POTENTIAL IMPACT | IMPLEMENTATION | | | | MONITORING | |
|---|--------------------------------|--|---|--|--|---|---|--|
| | | | RESPONSIBLE PERSON | MITIGATORY MEASURE (OBJECTIVES AND TARGET) | TIMEFRAME | RESPONSIBLE PERSON | FREQUENCY | PERFORMANCE INDICATOR |
| 6.1 Engineering Design | All aspects listed in the EMPr | Incompatibility between the design and the receiving environment | Developer | <p>Objective: To ensure the design of the God's Window Skywalk tourist facility takes into account the environmental sensitivities.</p> <p>Target: Assimilate requirements of the EMPr in the design and construction management giving special attention to the environmental sensitivities identified by the EIA specialists.</p> | During tender, design and design review stages | Mapulana Canyon and Mpumalanga Tourism and Parks Agency in consultation with appointed specialists. | Throughout design phase | Design meets objectives and does not degrade the receiving environment. |
| 6.2 Establishment of the construction site | Construction site | Construction activities infringing on no-go areas. | Developer, Contractor and ESA with the inputs from appointed specialists | <p>Objective: To ensure the establishment of the construction site does not infringe on or damage/pollute the no-go (buffer zone) areas.</p> <p>Target: Adequately fence off all no-go areas according to the specialist reports conducted as part of the EIA process. Erect no-go signage on the fences of these areas. Ensure all appointed staff and visitors are aware of these areas.</p> | Pre-construction phase | Developer, Contractor and ECO in consultation with appointed specialists. | Throughout pre-construction phase until targets are met. Monitor during construction phase. | No trespassing within or damage to the no-go areas. |
| 6.3 Establishment of the construction site | Construction site | Undue damage to or loss of vegetation | Mapulana Canyon and Mpumalanga Tourism and Parks Agency, Contractor and ESA | <p>Objective: To prevent and mitigate the undue damage or loss of natural vegetation outside the boundaries of the God's Window Skywalk footprint.</p> <p>Targets: Site establishment shall take place in an orderly manner and all amenities shall be installed or</p> | Pre-construction phase | Engineer and ECO | Once off, unless the site area changes in which case the method statement and layout | Establishment of construction site in compliance with objectives and no evidence of environmental degradation. |

| ACTIVITY | ASPECT | POTENTIAL IMPACT | IMPLEMENTATION | | | | MONITORING | |
|---------------------------------|-------------------|------------------------|--------------------|--|-------------------------------------|--------------------|-----------------------|----------------------------------|
| | | | RESPONSIBLE PERSON | MITIGATORY MEASURE (OBJECTIVES AND TARGET) | TIMEFRAME | RESPONSIBLE PERSON | FREQUENCY | PERFORMANCE INDICATOR |
| | | | | <p>be available before the onset of construction. Where such amenities are not available, chemical toilets shall be provided.</p> <p>A method statement is required from the Contractor that includes the layout of the site, management of facilities and wastewater management.</p> <p>A site plan of the construction site must be provided indicating waste areas, storage areas and placement of facilities</p> <p>The Contractor shall inform all site staff to the use of supplied ablution facilities and under no circumstances shall indiscriminate excretion and urinating be allowed other than in supplied facilities.</p> <p>The Contractor shall supply sealable waste collection bins and all solid waste collected shall be disposed of at a registered waste facility.</p> <p>Certificates of disposal shall be obtained by the Contractor and kept on file.</p> <p>Where a registered waste site is not available close to the construction site, the Contractor shall provide a method statement with regard to waste management. Under no circumstances may solid waste be burned on site or illegally dumped.</p> <p>Refuse bins will be emptied and secured.</p> <p>The construction site office and other areas must be placed on already disturbed land as far as possible.</p> <p>Fences and security access must be maintained, throughout the project.</p> <p>Emergency and contact numbers of the contractors must be available and prominently displayed on a signage board that is clearly visible.</p> | | | plan must be updated. | |
| 6.4 Establishment of the | Construction site | Loss of soil fertility | Contractor and ESA | <p>Objective:</p> <p>Whilst establishing the construction site the footprint of disturbance is to be minimised</p> | Design phase and site establishment | Engineer and ECO | Once-off | Established construction camp in |

| ACTIVITY | ASPECT | POTENTIAL IMPACT | IMPLEMENTATION | | | | MONITORING | |
|--|-------------------|---|--------------------|---|--|--------------------|--|--|
| | | | RESPONSIBLE PERSON | MITIGATORY MEASURE (OBJECTIVES AND TARGET) | TIMEFRAME | RESPONSIBLE PERSON | FREQUENCY | PERFORMANCE INDICATOR |
| construction site | | | | <p>thereby preventing the undue degradation and loss of soil.</p> <p>Targets:</p> <p>Protect stockpiles of topsoil and subsoil material with silt fences that should be maintained during the entire construction phase on site.</p> <p>Locate stockpiles outside of any buffer zones as indicated in the specialist reports and not on slopes with a gradient greater than 1:3.</p> <p>Identify and clearly demarcate existing infrastructure within the study area in order to avoid damage throughout the construction phase.</p> | | | | compliance with objectives and no evidence of environmental degradation |
| 6.5 Temporary closure of the construction site | Construction site | Potential impacts associated with the closure of the construction site. | Contractor and ESA | <p>Objective:</p> <p>To limit potential impacts on the environment for periods during which the construction site is closed.</p> <p>Targets:</p> <p>Should the construction site be closed for a period of more than one week, a report on compliance will be lodged with the Engineer and Project Manager confirming the following:</p> <p>No persons allowed other than project employees;</p> <p>Minimal materials kept stored.</p> <p>Materials will be stored in leak-proof, sealable containers or packaging.</p> <p>The store area is secure and locked.</p> <p>Fire extinguishers will be serviced and accessible.</p> <p>The area is secure from accidental damage through vehicle collision, etc.</p> <p>Emergency and contact numbers of the contractor will be available and prominently displayed.</p> <p>Chemical toilets are emptied, kept hygienically clean and secured.</p> | Closure of construction site (for example over holiday breaks) | Engineer and ECO | Whenever the construction camp is closed for longer than a week. | Closure of the construction camp in line with the requirements of the EMP. |

| ACTIVITY | ASPECT | POTENTIAL IMPACT | IMPLEMENTATION | | | | MONITORING | |
|--|--|--|--------------------|--|---|--------------------|--|--|
| | | | RESPONSIBLE PERSON | MITIGATORY MEASURE (OBJECTIVES AND TARGET) | TIMEFRAME | RESPONSIBLE PERSON | FREQUENCY | PERFORMANCE INDICATOR |
| | | | | 24 hour security will be on site during this period. | | | | |
| 6.6 Construction of site buildings | Materials used to construct site buildings | Soil pollution and permanent alternation to the receiving environment | Contractor and ESA | <p>Objective:</p> <p>To ensure the material for site buildings, used by the Contractor during the construction of the project, are removable and to minimise the impacts of the construction of the buildings on the environment.</p> <p>Targets:</p> <p>No permanent structures will be permitted at the construction site. Temporary structures shall be founded on a platform, either subsoil or screed slab. Buildings should preferably be prefabricated or constructed of re-usable/recyclable materials. All temporary structures must be soundly built and not pose a danger to workers. All structure footprints to be rehabilitated and landscaped after construction is complete.</p> | Pre-construction and site establishment | Engineer and ECO | Once off, unless the site area changes and/or new buildings are required, in which case additional inspections will be required. | On site buildings constructed according to the requirements of the EMPr. |
| 6.7 Operation of sanitation systems | Sanitation systems | <p>Unpleasant odours on site.</p> <p>Inadequate number of latrines on site.</p> <p>Position of latrines.</p> <p>Mis-management of waste water.</p> | Contractor and ESA | <p>Objective:</p> <p>To ensure good sanitation systems and management throughout the construction period.</p> <p>Targets:</p> <p>Adequate toilets must be provided for all staff. Chemical toilets must be emptied / serviced on a regular basis to prevent them overflowing. Proof of this must be provided to the ECO. A minimum of one toilet must be provided per 15 persons.</p> | Pre-construction and site establishment | Engineer and ECO | Once off, unless the site area changes and/or new buildings are required, in which case additional inspections will be required. | <p>Adequate toilets will be positioned at the right places as per the EMP and ECO.</p> <p>Absence of odours, erosion and build-up of detergents.</p> |
| 6.8 Vehicle parking. | Vehicle parking and parking area(s). | <p>Pollution of soils.</p> <p>Disturbance of soils due</p> | Contractor and ESA | <p>Objective:</p> <p>To ensure vehicles are parked according to the specifications in the EMPr and that equipment is handled appropriately.</p> | Throughout the construction period. | Engineer and ECO | Whenever there are stationary vehicles or equipment | No incidents of soil pollution due to spills from stationary vehicles and |

| ACTIVITY | ASPECT | POTENTIAL IMPACT | IMPLEMENTATION | | | | MONITORING | |
|--|--------------------------------------|---|--------------------|---|--|--------------------|--|--|
| | | | RESPONSIBLE PERSON | MITIGATORY MEASURE (OBJECTIVES AND TARGET) | TIMEFRAME | RESPONSIBLE PERSON | FREQUENCY | PERFORMANCE INDICATOR |
| Storage of equipment. | Storage of equipment. | parking of vehicles outside of designated areas. | | Targets: No storage of vehicles or equipment will be allowed outside of the designated area. Drip trays or any form of oil absorbent material must be placed underneath vehicles and equipment when not in use. | Planning to be done during site establishment phase. | | present on site. | equipment. No undue disturbance of soils. No incidents of vehicles being parked outside the designated parking area. |
| 6.9 Servicing and washing of vehicles and machinery | Workshop and equipment storage areas | Water contamination. Soil contamination. Noise pollution. | Contractor and ESA | Objective: To ensure that the environment is not polluted by ensuring that service areas and wash bays for vehicles and machinery are made available and utilised. Targets: No servicing of equipment on site. Leaking equipment shall be repaired immediately or be removed from site to facilitate repair All potentially hazardous and non-degradable waste shall be collected and removed to a registered waste site The Contractor shall be in possession of an emergency spill kit that must be complete and available at all times on site Only emergency repairs shall be allowed on site and a drip tray shall be used to prevent oil spills The contractor must ensure that delivery drivers and plant operators are informed of all relevant procedures and restrictions required ensuring compliance with this document All vehicles and equipment must be well maintained to ensure that there are no oil or fuel leakages. The following shall apply: | Whenever servicing or maintaining of vehicles or equipment throughout the construction period. | Engineer and ECO | Daily monitoring by CER and weekly inspections by ECO. | Evidence of prescribed servicing and washing services. No incidents of soil or water contamination. No complaints of noise pollution due to servicing and washing of vehicles. |

| ACTIVITY | ASPECT | POTENTIAL IMPACT | IMPLEMENTATION | | | | MONITORING | |
|---------------------------|-----------|---|--------------------------------|---|--|--------------------|--|---|
| | | | RESPONSIBLE PERSON | MITIGATORY MEASURE (OBJECTIVES AND TARGET) | TIMEFRAME | RESPONSIBLE PERSON | FREQUENCY | PERFORMANCE INDICATOR |
| | | | | <ul style="list-style-type: none"> All contaminated soil / yard stone shall be removed and be placed in containers. Contaminated material can be taken to one central point where bioremediation can be done. A specialist Contractor shall be used for the bioremediation of contaminated soil where the required remediation material and expertise is not available on site. All spills of hazardous substances must be reported to the ECO. | | | | |
| 6.10 Personnel conduct | Personnel | Infringement of the EMPr requirements by personnel on site. | Contractor, ESA and labourers. | <p>Objective: To ensure that personnel are adhering to the EMPr requirements.</p> <p>Targets: The Contractor will adhere to all requirements of the Occupational Health and Safety Act (Act 56 of 2004), including the drafting of a suitable Health and Safety Plan which will be implemented during the construction phase.</p> <p>All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Toolbox talks to include aspects of the EMPr, especially specialist mitigation measures. Warning signs must be placed on and around the site as per the Occupational, Health and Safety requirements. Adequate first aid services must be provided by the contractor. The contractor will be responsible for his own security arrangements and shall comply with all site security instructions. Basic fire-fighting equipment must be available on site.</p> | Approved PPE must be issued to all employees pre-construction but must be used for the duration the construction phase | Engineer and ECO | Daily monitoring by ESA and safety officers. | Personnel wearing proper safety uniform. Absence of trespassers on site |

| ACTIVITY | ASPECT | POTENTIAL IMPACT | IMPLEMENTATION | | | | MONITORING | |
|----------|--------|------------------|--------------------|---|-----------|--------------------|------------|-----------------------|
| | | | RESPONSIBLE PERSON | MITIGATORY MEASURE (OBJECTIVES AND TARGET) | TIMEFRAME | RESPONSIBLE PERSON | FREQUENCY | PERFORMANCE INDICATOR |
| | | | | PPE to be provided and well maintained. All incidents should be reported to ECO, investigated, documented and kept in safety file. | | | | |

7 MATERIALS

Table 8: Handling Materials

| ACTIVITY | ASPECT | POTENTIAL IMPACT | IMPLEMENTATION | | | | MONITORING | |
|------------------------------------|--------------------|---|---------------------|--|---|--------------------|-------------------------------|---|
| | | | RESPONSIBLE PERSON | MITIGATORY MEASURE (OBJECTIVES AND TARGET) | TIMEFRAME | RESPONSIBLE PERSON | FREQUENCY | PERFORMANCE INDICATOR |
| 7.1 Transportation of materials | Material transport | Traffic congestions. Production of dust during transportation. Excessive noise. | Contractor and ESA. | <p>Objective: To ensure that whilst material is transported, it cannot be of negative influence to the surrounding environment.</p> <p>Target: The contractor should note that existing roads are sufficient to facilitate access to the new office site and that the following should be adhered to: Adequate and appropriate traffic warning signage must be erected where applicable, along transport routes and access roads. The Contractor shall take preventative measures e.g. screening, muffling (where possible), timing, pre-notification of affected parties to minimise complaints regarding noise and vibration nuisance from construction activity sources. Fine materials such as sand must be covered during transportation. Appropriate response plans must be prepared by the contractor to ensure the fastest possible reaction to spills or accidents. Deliveries must be scheduled for off-peak hour traffic times. All trucks and vehicles removing spoil from the site must have load areas and must be covered by a tarpaulin (plastic / synthetic sheets / covers) to prevent rocks and spoil falling onto the road surfaces. Vehicle speeds on site should not exceed 20 km/hr. All drivers are to have licences for driving and operating plant on site</p> | Targets to be implemented prior to start of construction and continually implemented throughout construction phase. | Engineer and ECO. | Throughout construction phase | <p>Covering of material during transportation. No complaints received. Emergency reaction plan (for spills/accidents) must always be readily available on site.</p> |

| ACTIVITY | ASPECT | POTENTIAL IMPACT | IMPLEMENTATION | | | | MONITORING | |
|---|--|--|--------------------|--|---------------------|--------------------|--|---|
| | | | RESPONSIBLE PERSON | MITIGATORY MEASURE (OBJECTIVES AND TARGET) | TIMEFRAME | RESPONSIBLE PERSON | FREQUENCY | PERFORMANCE INDICATOR |
| | | | | All road vehicles to be road worthy. | | | | |
| 7.2 Storage and handling of hazardous materials. | Hazardous material handling and storage. | Contamination of soil, water and groundwater by hazardous material. Inadequate remediation measures for spills. | Contractor and ESA | <p>Objective: To ensure adequate protection of soil and soil remediation measures in case of spills.</p> <p>Targets: Hazardous materials – such as paint, cement, fuels, bitumen, fuel, oil, herbicides, battery acid or detergents – must be stored in sealed, lockable containers when not in use. A register shall be kept of all substances and be available for inspection at all times. Areas shall be monitored for spills and any spills shall be contained, cleaned and rehabilitated immediately. No decantation into unmarked containers or containers with incorrect labels. No decanted fuel to be left unattended in the sun. When handling hazardous materials, manufacturer's specifications must be complied with. The 16 point Material Safety Data Sheet is available on site. Drip trays must be used when handling hazardous substances. No hazardous substance containers may be placed on soil. All spills (minor and major) must be cleaned and remediated to the satisfaction of the ECO and CER within 24 hours of occurrence. The contractor must ensure that there is a supply of absorbent material (e.g. Drizit) and clean-up materials readily available to absorb, breakdown and, where possible, encapsulate minor hazardous material spillages. No material may be stacked higher than 2m. All products are to be stored with compatibility in mind. Storage areas shall display the required safety signs depicting "No smoking", "No naked lights" and "Danger". Containers shall be clearly</p> | Construction period | Engineer and ECO | For the duration of the construction period dependent on the presence of hazardous material on site. | Storage of hazardous materials in sealed and lockable containers. No evidence of spills on site. Absorbent and clean-up material readily available on site. |

| ACTIVITY | ASPECT | POTENTIAL IMPACT | IMPLEMENTATION | | | | MONITORING | |
|--------------------------------|---------------|---|--------------------|--|--|--------------------|--|---|
| | | | RESPONSIBLE PERSON | MITIGATORY MEASURE (OBJECTIVES AND TARGET) | TIMEFRAME | RESPONSIBLE PERSON | FREQUENCY | PERFORMANCE INDICATOR |
| | | | | <p>marked to indicate contents as well as safety requirements.</p> <p>The contractor shall supply a method statement to the engineer for approval for the storage of hazardous materials prior to site preparation. Appoint appropriate contractors to remove any residue from spillages from site. Handling, storage and disposal of excess or containers of potentially hazardous materials shall be in accordance with the requirements of pertinent Regulations and Acts (e.g. Hazardous Substances Act, Number 15 of 1973; National Water Act, Number 36 of 1998.</p> | | | | |
| 7.3 Storage of fuel | Storage areas | Contamination of soil by fuel. Inadequate remediation measures for spills. | Contractor and ESA | <p>Objective:</p> <p>To ensure that there is optimum environmental protection (especially soil) from fuel spills.</p> <p>Targets:</p> <p>Fuel must be stored in above ground storage tanks or sealed containers, contained within a bunded area with sump drainage. All bunds must be designed to contain at least 110% of the tank or drum storage capacity (this shall apply to above ground storage, and include fuels). No drainage from fuel storage areas shall be permitted. Any other hazardous substances stored in bulk will require bunding.</p> | Pre-construction phase and site establishment. | ECO | Once-off | Established fuel storage areas in compliance with the objectives of the EMPr. |
| 7.4 Use of cement | Cement | Contamination of soil and surrounding environment. Decrease in ambient air quality. | Contractor and ESA | <p>Objective:</p> <p>To ensure that the environment is protected from cement that will be used on site.</p> <p>Targets:</p> <p>Should cement must be delivered in sound and properly secured bags or in approved bulk containers. Cement products in bags must be stored in storage containers to be provided at the</p> | As long as cement is in use on site. | ECO | Weekly ECO monitoring and monthly audits | Cement delivery, storage and use will be in line with the EMPr requirements. |

| ACTIVITY | ASPECT | POTENTIAL IMPACT | IMPLEMENTATION | | | MONITORING | | |
|----------|--------|------------------|--------------------|---|-----------|--------------------|-----------|-----------------------|
| | | | RESPONSIBLE PERSON | MITIGATORY MEASURE (OBJECTIVES AND TARGET) | TIMEFRAME | RESPONSIBLE PERSON | FREQUENCY | PERFORMANCE INDICATOR |
| | | | | <p>construction camp and should only be opened when needed.</p> <p>The storage facility and surrounding area must be swept and cleaned regularly as required to ensure that cement products do not the pollute the surrounding environment.</p> <p>Cement bags are not to be burnt on site but should be disposed of at a registered hazardous waste disposal site, as mandated by the manufacturer and the applicable legislation.</p> <p>No concrete batching on bare soil.</p> | | | | |

8 WASTE

Table 9: Handling Waste

| ACTIVITY | ASPECT | POTENTIAL IMPACT | IMPLEMENTATION | | | | MONITORING | |
|---|--------------------|--|---------------------|---|--|--------------------|---|--|
| | | | RESPONSIBLE PERSON | MITIGATORY MEASURE (OBJECTIVES AND TARGET) | TIMEFRAME | RESPONSIBLE PERSON | FREQUENCY | PERFORMANCE INDICATOR |
| 8.1 Storage, removal and disposal of construction waste | Construction waste | Land pollution. Compaction of soil by rubble. Decreased aesthetic integrity of the site. | Contractor and ESA. | <p>Objective: To ensure that waste is correctly stored and disposed of, decreasing the visual impact during the construction and post construction period. Disposal of rubble and refuse in an appropriate manner. Minimise litigation. Minimise public complaints.</p> <p>Target: Surplus concrete, sludge, silt, rubble or any other construction waste may not be dumped indiscriminately on site but shall be disposed of in a registered waste landfill site or recycled as per the approved contractor's Waste Management Plan. Concrete trucks shall not be washed on site after depositing concrete unless it is within an appropriate wash bay. Any spilled concrete shall be cleaned up immediately. Bins and containers/skips must be made available by the contractor for the storage of construction waste and the bins to be removed from site as required. Temporary storage of construction waste will take place within the site, and within areas designated by the ECO and the Contractor according to the approved site layout plan. The Contractor will be responsible to remove and transport all construction waste material off site to a registered waste disposal or recycling facility (proof of this as well as a copy of the sites Registration Permit, must be provided by the Contractor to the ECO).</p> | Waste bins/ skips must be available prior to construction. Removal of waste throughout the construction period. | ECO. | Throughout construction phase and at a frequency agreed upon in the approved waste management plan. | Construction waste stored, collected and disposed of as per the requirements of this EMPr. |

| ACTIVITY | ASPECT | POTENTIAL IMPACT | IMPLEMENTATION | | | | MONITORING | |
|---|----------------|---|--------------------|---|--|--------------------|--|--|
| | | | RESPONSIBLE PERSON | MITIGATORY MEASURE (OBJECTIVES AND TARGET) | TIMEFRAME | RESPONSIBLE PERSON | FREQUENCY | PERFORMANCE INDICATOR |
| | | | | No burning of waste is permitted on site. No waste is permitted to pollute the watercourses. | | | | |
| 8.2 Storage, removal and disposal of domestic waste. | Domestic waste | Land pollution. Unpleasant odours. Decreased aesthetic integrity of the site. | Contractor and ESA | <p>Objective: To ensure that waste is correctly stored and disposed of, decreasing the visual and possible environmental impact during the construction and post construction period.</p> <p>Targets: The Contractor must supply sealable waste bins at the construction camp for the storage of domestic waste. Clearly marked waste bins are to be provided for the separation of waste according to the WMP. Recyclable waste, including glass, paper and plastic must be separated at the construction camp, stored and recycled, where economically feasible. Personnel must be informed about the necessity of using the waste drums. The Contractor must do site clean-ups of litter other than construction waste on a daily basis, and dispose of it in the designated refuse bins provided. The contractor must ensure that general site-wide litter clean-up will occur at least once a week. The Contractor must dispose of all domestic refuse generated by his staff and Sub-Contractors on a weekly basis at a registered waste disposal facility. The Contractor must provide proof of this to the ECO in the form of a safe disposal certificate. Sealable waste drums should be provided in close proximity to all working areas during the construction of the new office building. The waste storage area must not be allowed to overflow with waste.</p> | Waste bins/skips must be available prior to construction. Removal of waste throughout the construction period. Regular removal of waste from waste storage area to registered disposal site. | Engineer and ECO | Waste bins/skips must be available prior to construction. Throughout construction phase and at a frequency agreed upon in the approved waste management plan. | Evidence of domestic waste stored, removed and disposed of according to the requirements indicated in this EMPr. |

| ACTIVITY | ASPECT | POTENTIAL IMPACT | IMPLEMENTATION | | | | MONITORING | |
|--|-----------------|--------------------------|--------------------|---|--------------------------------|--------------------|---|---|
| | | | RESPONSIBLE PERSON | MITIGATORY MEASURE (OBJECTIVES AND TARGET) | TIMEFRAME | RESPONSIBLE PERSON | FREQUENCY | PERFORMANCE INDICATOR |
| 8.3 Storage, removal and disposal of hazardous waste | Hazardous waste | Soil and water pollution | Contractor and ESA | <p>Objective: To ensure that soil and the rest of the surrounding environment on site is protected from hazardous waste.</p> <p>Targets: The Contractor is required to refer to the Hazardous Substances Act No 15 of 1973 act to determine whether any substance (new or waste) stored on site is subject to controls contained within the act. All hazardous waste must be stored in sealed and suitably marked containers for removal to a registered hazardous waste disposal facility. Any oil spillage on site will be excavated to a depth of 150 mm and disposed of for removal to a registered hazardous waste disposal site. Excavated areas are to be refilled with suitable replacement material. Alternative in-situ remediation techniques could be used, if approved by the ECO. Contaminated water must be stored in sealable marked containers and disposed of with other waste water from the construction works. Refer and adhere to the approved Waste Management Plan as compiled by the Contractor and approved by the ECO.</p> | Throughout construction phase. | ECO | Old hydrocarbons and other hazardous materials must be removed on a regular basis (at least every 30 days). | All mitigation measures with regards to Hazardous waste mentioned in the EMP are implemented. |

9 SURROUNDING PROPERTIES

Table 10: Surrounding Properties

| ACTIVITY | ASPECT | POTENTIAL IMPACT | IMPLEMENTATION | | | | MONITORING | |
|------------------------------|--------------|--|---------------------|--|--|--------------------|------------|---|
| | | | RESPONSIBLE PERSON | MITIGATORY MEASURE (OBJECTIVES AND TARGET) | TIMEFRAME | RESPONSIBLE PERSON | FREQUENCY | PERFORMANCE INDICATOR |
| 9.1 Use of existing roads | Access roads | Damage to access roads. Damage to environment Erosion. | Contractor and ESA. | <p>Objective: To minimise damage to existing roads.</p> <p>Target: Care to be taken to prevent damage to existing access roads. Adhere to traffic signs and road markings. Ensure that open trucks are covered with tarpaulins (plastic liners) to ensure no transported materials fall onto the road surface.</p> | Implement during site establishment and monitor throughout construction phase. | ECO. | Daily | <p>No claims from Landowners due to further damage on existing access roads.</p> <p>No damage visible on access roads</p> |

10 FAUNA, FLORA, AIR QUALITY, NOISE, WATER AND OTHER ENVIRONMENTAL ASPECTS

Table 11: Flora, fauna, air quality, noise, water and other

| ACTIVITY | ASPECT | POTENTIAL IMPACT | IMPLEMENTATION | | | | MONITORING | |
|---|--------------------------------------|---|---------------------|--|--|--------------------|-------------------|--|
| | | | RESPONSIBLE PERSON | MITIGATORY MEASURE (OBJECTIVES AND TARGET) | TIMEFRAME | RESPONSIBLE PERSON | FREQUENCY | PERFORMANCE INDICATOR |
| 10.1 Vegetation clearing | Vegetation | Damage to vegetation. Erosion and sedimentation. | Contractor and ESA. | <p>Objective: Minimise damage to vegetation.</p> <p>Target: The objective of vegetation clearing is to trim, cut or clear the minimum number of trees and vegetation necessary for safe construction and operation of the God's Window Skywalk tourist facility. No vegetation shall be pushed into heaps or left lying on the site. Where possible, do not clear vegetation in areas where construction activities are only planned for a later period (i.e. implement a phased approach). All topsoil removed to be stored for future use during rehabilitation.</p> | Plan vegetation clearing according to construction timeframes during pre-construction phase. Clearing to be done during construction phase as required. | ECO. | Weekly monitoring | No unnecessary loss of vegetation. |
| 10.2 Vegetation clearing | Conservation and protection of flora | Unnecessary removal of flora. Removal of vegetative matter for firewood. | Contractor and ESA. | <p>Objective: Minimise extent of vegetation removal.</p> <p>Target: Only eradicated or trimmed-down vegetation matter may be removed from site. No vegetative matter may be removed for firewood – this is strictly prohibited No open fires are permitted. No material storage or lay down is permitted under trees.</p> | During the establishment of the construction site. | | Weekly monitoring | No unnecessary loss of vegetation. |
| 10.3 Protection and handling | Protection of fauna | Intentional or unintentional | Contractor and ESA. | <p>Objective:</p> | Throughout the construction and post | ECO | Continuous | No evidence of domestic animals on site. |

| ACTIVITY | ASPECT | POTENTIAL IMPACT | IMPLEMENTATION | | | MONITORING | | |
|----------------------------|--------|---|--------------------|--|----------------------|--------------------|-----------|---|
| | | | RESPONSIBLE PERSON | MITIGATORY MEASURE (OBJECTIVES AND TARGET) | TIMEFRAME | RESPONSIBLE PERSON | FREQUENCY | PERFORMANCE INDICATOR |
| of possible fauna on site. | | <p>killing of fauna on site.</p> <p>Loss of fauna due to habitat disturbance.</p> | | <p>To ensure that fauna found on site are protected and not interfered with.</p> <p>Target:</p> <p>The contractor must ensure that the site is kept clean and free of rubbish that could potentially attract animal pests, and that rubbish bins are scavenger proof.</p> <p>The contractor must report problem animals or vermin to the ECO.</p> <p>Ensure that domesticated animals belonging to the local community are kept away from the construction works.</p> <p>The contractor may under no circumstances make use of pesticide or poison to control unwanted animals.</p> <p>Animals (incl. snakes, tortoises and lizards) must be removed from the site should they be directly threatened by the vegetation clearance or construction activities. The ESA or ECO must be contacted for assistance in this regard. Snake handling must be done by an appropriately trained individual.</p> <p>Excavations and trenches must be inspected daily (first thing in the morning) to check whether any animals have been trapped. Any trapped animals must be removed and relocated to a safe location outside of the development footprint.</p> <p>In terms of fencing and movement of fauna, the following must be implemented:</p> <ul style="list-style-type: none"> ▶ Small ground level openings, 20-30 cm in height, should be kept clear in electrical fencing, at least at strategic places, to facilitate the movement of small mammals and reptiles to move through the site; ▶ Fencing (e.g. palisade) must provide appropriate opening for animals to pass through – bars placed 20cm apart should provide sufficient space for the movement of small animals whilst deterring human; | construction period. | | | The site is kept clean and does not attract pests or local fauna. |

| ACTIVITY | ASPECT | POTENTIAL IMPACT | IMPLEMENTATION | | | | MONITORING | | |
|---|---|--|---------------------|---|-------------------------------------|--------------------|---|--|--|
| | | | RESPONSIBLE PERSON | MITIGATORY MEASURE (OBJECTIVES AND TARGET) | TIMEFRAME | RESPONSIBLE PERSON | FREQUENCY | PERFORMANCE INDICATOR | |
| | | | | <p>and</p> <p>▶ If not electrified, the bottom wire of perimeter fence must be at least 15cm from the ground, 20cm if electrified (tortoises retreat into shell when shocked).</p> | | | | | |
| 10.4 Earthworks | Dust control | Air pollution | Contractor and ESA. | <p>Objective:</p> <p>To reduce the generation of dust on the construction site.</p> <p>Target:</p> <p>Dust suppression is to be conducted during construction, or as complaints are received. The Contractor is to take appropriate measures to minimise the generation of dust as a result of excavation works (such measures include frequent spraying during low rainfall periods or by using chemical dust binding agents approved by the ECO).</p> | Throughout construction period. | ECO | During periods of low rainfall or as required by the ECO. | Dust is kept at its lowest level on site. | |
| 10.5 Use of construction vehicles and equipment | Construction vehicles, plant and machinery. | Noise and vibration. | Contractor and ESA. | <p>Objective:</p> <p>Noise levels are kept to a minimum on site.</p> <p>Target:</p> <p>Should construction have to continue after hours, all affected stakeholders must be notified. All machinery and equipment must be maintained in good working order, and fitted with approved and specified muffler systems (where possible). The contractor shall have an updated complaints register on site.</p> | Throughout the construction period. | Engineer and ECO | Continuous | No complaints received from affected communities / stakeholders. | |
| 10.6 Water use and protection of the watercourse | Water management | Water wastage. Pollution of the watercourse. Degradation of the downstream water | Contractor and ESA. | <p>Objective:</p> <p>To prevent the pollution of water, any long-term degradation of the area's watercourses and the unnecessary wastage of water.</p> <p>Target:</p> <p>Comply with all requirements of the approved WUL and aquatic assessments.</p> | Construction phase | Engineer and ECO | Continuous when these activities are taking place. | Activities undertaken near watercourses must be in-line with and consider the specified environmental controls | |

| ACTIVITY | ASPECT | POTENTIAL IMPACT | IMPLEMENTATION | | | | MONITORING | |
|--|--------------------|---------------------------------------|---------------------|--|--|--------------------|---|--|
| | | | RESPONSIBLE PERSON | MITIGATORY MEASURE (OBJECTIVES AND TARGET) | TIMEFRAME | RESPONSIBLE PERSON | FREQUENCY | PERFORMANCE INDICATOR |
| | | resource. | | <p>Maintain all required buffer zones as per specialist assessments.</p> <p>During the execution of the works, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented e.g. including ensuring that construction equipment is well maintained and drip trays must be used at all times.</p> <p>The use of silt fences are more important during summer months (rainy seasons) and would require more regular maintenance during this time.</p> <p>Where earthwork is being undertaken in close proximity to any watercourse, slopes must be stabilised using suitable materials, i.e. sandbags or geotextile fabric, to prevent sand and rock from entering the watercourses. Appropriate rehabilitation and re-vegetation measures for the watercourse banks must be implemented timeously. In this regard, the banks should be appropriately and incrementally stabilised as soon as development allows.</p> <p>All water used on site must be done so sparingly.</p> <p>Toolbox talks must include the conservation of water.</p> <p>Avoid unnecessary vehicle crossings and access into the watercourse.</p> <p>Any dewatering that needs to be done from excavated areas during the construction phase should be released into a silt bay that is maintained in order to trap and remove sediments before they enter watercourse habitat.</p> | | | | |
| 10.7 Protection of heritage resources | Heritage resources | Damage to heritage resources on site. | Contractor and ESA. | <p>Objective:</p> <p>To prevent any damage to heritage resources on site.</p> <p>Target:</p> <p>In the event that any sub-surface heritage resources or graves are unearthed all work has to be stopped until an assessment as to the significance of the site (or material) in question has been made by a heritage practitioner.</p> <p>No archaeological material that has been uncovered may be removed. This applies to graves and cemeteries as well. In the event that any graves or burial places are</p> | Continuous monitoring throughout the construction phase. | ECO | Daily monitoring by ESA and weekly inspections by ECO | No damage to heritage resources on site. |

| ACTIVITY | ASPECT | POTENTIAL IMPACT | IMPLEMENTATION | | | MONITORING | | |
|----------|--------|------------------|--------------------|---|-----------|--------------------|-----------|-----------------------|
| | | | RESPONSIBLE PERSON | MITIGATORY MEASURE (OBJECTIVES AND TARGET) | TIMEFRAME | RESPONSIBLE PERSON | FREQUENCY | PERFORMANCE INDICATOR |
| | | | | <p>located during the development, the procedures and requirements pertaining to graves and burials will apply. If human remains are uncovered, or previously unknown graves are discovered, a qualified archaeologist needs to be contacted and an evaluation of the finds made. If the remains are to be exhumed and relocated, the relocation procedures as accepted by SAHRA need to be followed.</p> <p>If any archaeological material is uncovered during the course of development, then work in the immediate area should cease. The find will need to be reported to SAHRA or an archaeologist.</p> <p>If any area that contains stone artefacts in reasonable numbers (e.g. more than 10 within a few metres of one another) or in high concentrations is noted during the proposed developments this should be inspected by an archaeologist prior to any disturbance.</p> <p>Follow the chance find protocol attached to this document.</p> | | | | |

11 REHABILITATION

Table 12: Rehabilitation

| ACTIVITY | ASPECT | POTENTIAL IMPACT | IMPLEMENTATION | | | | MONITORING | |
|---|----------------|--|---------------------|---|--|--------------------|------------|--|
| | | | RESPONSIBLE PERSON | MITIGATORY MEASURE (OBJECTIVES AND TARGET) | TIMEFRAME | RESPONSIBLE PERSON | FREQUENCY | PERFORMANCE INDICATOR |
| 11.1 Rehabilitation of disturbed areas | Rehabilitation | Visual impact of construction site due to poor or no rehabilitation. Risks of erosion and sedimentation of watercourse due to poor or no rehabilitation. Potential dust impact due to poor or no rehabilitation. | Contractor and ESA. | <p>Objective: To ensure adequate rehabilitation of the entire construction site upon completion of construction activities.</p> <p>Target: Completed areas are to be rehabilitation as soon as possible by following a phased approach. Rehabilitated areas are to be fenced off to prevent further disturbance during the construction phase. Indigenous species are to be used where feasible, especially when considering the planting of new trees. Where indigenous species are not considered, the contractor shall ensure that, at a minimum, the area is rehabilitated back to its original state. All waste, storage areas, bunds, toilets, temporary roads, buildings, etc. shall be removed from site and legally and appropriately disposed of.</p> | Implement during construction phase as and when sections of the works are completed. | Engineer and ECO. | Daily | God's Window Skywalk tourist facility area adequately rehabilitated after construction completion. No complaints from the Employer or stakeholders. |

12 PLANNING AND ENGINEERING CONSIDERATIONS

Table 13: Planning and Engineering Considerations

| ACTIVITY | ASPECT | POTENTIAL IMPACT | IMPLEMENTATION | | | | MONITORING | |
|---------------------------------|-------------------------|---|---------------------|---|--|--------------------|------------|--|
| | | | RESPONSIBLE PERSON | MITIGATORY MEASURE (OBJECTIVES AND TARGET) | TIMEFRAME | RESPONSIBLE PERSON | FREQUENCY | PERFORMANCE INDICATOR |
| 12.1 Construction activities | Existing infrastructure | Disruption of services, damage to installations, damage or loss of plant. | Contractor and ESA. | <p>Objective: To prevent disruption or damage to existing infrastructure or services.</p> <p>Target: Telephone line, power lines and fibre lines shall be identified during the construction operations. Possible known pipelines must be considered during planning and construction. Where pipelines are found, the depth of the pipes under the surface shall be determined to ensure that proper protection is afforded to such structures. Any damage to pipelines shall be repaired immediately. All existing access roads used for construction purposes, shall be maintained at all times to ensure that neighbours have free access to and from their properties. Speed limits shall be enforced in such areas and all drivers shall be sensitised to this effect.</p> | Prior to construction and during construction. | Engineer and ECO. | Continuous | <p>No unplanned disruptions of services</p> <p>No damage to any plant or installations.</p> <p>No complaints from authorities or Landowners regarding disruption of services.</p> <p>No litigation due to losses of plant, or installations.</p> |

13 NON-COMPLIANCE AND PENALTIES

Non-compliance with this EMPr must be monitored by the ECO and reported in the monthly ECO Reports. Any non-compliance must be reported to the CA.

Penalties or fines must be issued at the discretion of the Engineer as per the penalties agreement between the Engineer and Contractor. The ECO to take up any non-compliance issues that may result in a fine or penalty with the Engineer.

It should however be noted that the nature of the activities associated with the project, even with the best of intentions, will inevitably cause some form of environmental degradation. The costs of having to make good on such environmental degradation is usually sufficient punishment without the need to look to other punitive measures. The implementation of a penalty system therefore requires careful consideration:

- ▶ Penalties would typically be warranted by persistent negligence on the part of the Contractor or failure to respond adequately to environmental considerations;
- ▶ Removal from site would typically be warranted where a particular staff member or piece of equipment is the cause of persistent environmental damage following previous warnings; and
- ▶ Suspension of the Works would only be warranted under rare circumstances where the Contractor's actions have caused or are likely to cause significant environmental degradation.

The type and extent of the corrective measures required to address non-compliance would depend on the nature of the transgression and the Contractor's history in terms of compliance with their environmental obligations. When deciding on the nature of any punitive actions, however, it is important to recognise that the effective implementation of the Construction EMPr is highly dependent on the quality of the working relationships that develop between the key role-players. Accordingly, an excessive response to non-compliance, particularly for a minor or unintentional transgression, may cause significant environmental degradation in the long term due to its effect in eroding the Contractor commitment to meeting their environmental responsibilities. Moreover, other mechanisms, such as an expanded environmental induction programme, may prove more effective than purely punitive measures in controlling non-compliance in the long-term. This is an important consideration that must be borne in mind by the Engineer and the Contractor when responding to non-compliances on site.

14 OPERATIONAL PHASE

The operational phase commences when the proposed development is being used for its intended purpose i.e., tourist destination. It is possible that there will be a period in the project life cycle where the construction and operational phase will overlap. This phase will include ongoing operation, monitoring and maintenance of the tourist facility, as well as continuing environmental management requirements (e.g., removal of alien and invasive vegetation).

14.1 Alien and Invasive Plant Management Plan

The Alien and Invasive Plant (AIP) Management Plan must be drafted for implementation, covering all phases of the project from construction to operation.

14.2 Erosion Control

The areas surrounding the sites, particularly the watercourses must be monitored for signs of erosion and remedial actions implemented where required. The erosion management specifications described under the construction phase EMPr must be fully implemented, where applicable.

14.3 Waste Management

The incorrect management of solid waste can result in the pollution of soil, groundwater, and the general environment. Windblown litter can contribute to negative visual impacts and if consumed by grazing animals could result in fatality. In addition to the waste management methods discussed above, the following waste management practices must be implemented during the operational phase:

- ▶ Provide adequate scavenger proof waste bins at the facility;
- ▶ Set up a system for regular waste removal using accredited service providers and dispose at an approved facility – preferably weekly;
- ▶ All solid and liquid waste must be removed from the operational areas and not discarded in the natural vegetation/veld;
- ▶ Minimise waste by sorting wastes into recyclable and non-recyclable waste streams (an independent contractor can be appointed to conduct this recycling if practical);
- ▶ No waste may be buried or burned under any circumstances;
- ▶ Hazardous waste must be removed from the site by an approved service provider e.g. used oil – certificates of safe disposal should be kept on record;
- ▶ No hazardous waste may be spoiled at the facility;
- ▶ A housekeeping team should be appointed to regularly maintain the litter and rubble situation on the facility; and
- ▶ Littering by the employees and visitors shall not be allowed under any circumstances.

15 DECOMMISSIONING

The decommissioning phase refers to the discontinuation of the tourist facility and removal of all associated infrastructure. This would entail dismantling the visitors centre, skywalk, skybridge and all auxiliary infrastructure. Rehabilitation of the site to a suitable end use would also form part of the decommissioning phase. However, it is highly unlikely that the facility would be demolished and return the site to pre-construction conditions. The intention is to continue with the project for as long as the concession period of 27 years or for as the developed project is sustainable, whichever is the longest.

A Closure Plan is not applicable to this project as it is not anticipated that the proposed project will be closed. In case that there is a need to close the development, a closure plan should be developed at the time of closure. This would likely take place during the closure of the entire development footprint, comprising of all infrastructure. All the relevant authorisations relating to closure should be granted before closure activities commences.

16 CONCLUSION

The EMPr must be regarded as a living document and changes must be made to this EMPr as required as when the project evolves, while retaining the underlying principles and objectives on which the document is based. The compilation of the EMPr has incorporated environmental management best practice principles, impacts and mitigation measures from the draft Environmental Impact Assessment Report and all environmental specialist assessment reports (i.e., included as Annexure D of the Basic Assessment Report) as well as the draft Social Impact Assessment Report.

17. REFERENCES

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Appendix A: EAP details

Qualifications

BA (Hons) Geography

BA Geography and
Environmental
Management

Professional registrations

Member, Geo-Information
Society of South Africa
(GISSA)

Member, International
Association of Impact
Assessment South Africa
(IAIASa)

Environmental
Assessment Practitioner
(EAP), Environmental
Assessment Practitioners
Association of South
Africa (EAPASA)

Specialisation

Environmental
management and
geographic information
systems (GIS)

18

years in industry

Natanya Whitehorn

Lead Environmental Practitioner



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

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

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

Experience

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

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

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

Seriti Coal has a contract to supply Kriel Power Station with 8.5 Mtpa of coal through a contract which has been extended to 2039. To best service this contract Seriti commissioned a trade-off study into transporting coal by rail, overland conveyor and haul truck. This study was revisited with the exclusion of the rail option in the report mentioned above in which additional information such as the existence of a haul fleet and tip was included. Both Kriel Colliery and Kriel Power Station are situated near the town of Kriel in Mpumalanga. Zutari is the engineering consultants on the project reviewing the trade off study. Zutari was also appointed to conduct an environmental impact assessment (EIA) and water use licence application (WULA) for the proposed construction of a beneficiation plant at the Seriti Kriel opencast coal mine, proposed opencast mining of Pits 11 and 13 as well as the proposed dragline relocation walk at the Seriti Kriel opencast coal mine. These services are to ensure compliance with the National Environmental Management Act (Act No. 107 of 1998) (NEMA), National Water Act, 1998, as well as other associated or required environmental authorisations. Responsible for overall project management, including writing the inception, scoping, EIA and EMP reports. Also responsible for managing all specialists and sub-contractors as well as overall financial management of the environmental component of the project.

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

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

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

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



the Lesotho Lowlands Bulk Water Supply Scheme, Lesotho, Lesotho Water Commission, 06/2018 - 03/2019, Project Manager/Environmental Specialist

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

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

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

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

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

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

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

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

The Botswana-South Africa (BOSA) Transmission Interconnector Project entails the construction of approximately 560 km of 400 kV transmission line between Botswana and South Africa to alleviate congestion on the Matimba-Phokoje-Insukamini line, increase the power transfers within the Southern African Power Pool (SAPP) network, increase stability in the power pool and improve system control, adequacy and reliability. Zutari was appointed to provide transaction advisory services, including a scoping study and a feasibility study up to the project implementation phase, which included procurement of an engineering, procurement and construction (EPC) firm and project financial close. Zutari's services focussed on the collection of data and information, techno-economic and financial analysis, market review and analysis, evaluation of analytical results, advice on institutional and legal framework, reporting and liaising with client and sponsor management committees. Responsible for providing environmental support to project team.

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

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

Section 24G environmental application for Nkomazi Game Reserve, South Africa, Nkomazi

Game Reserve, 08/2016 - 12/2017, Geographic Information Systems (GIS) Support Expert

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

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

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

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

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

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

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

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

Extensive augmentation of water supply in the Lephalale region is required for the development of the Medupi Power Station and related coal mining and industrial activities. The infrastructure is being developed in two phases. Phase 1 comprises a 4.5 MW pump station and 43 km of up to 1.1 m diameter pipeline, delivering approximately 40 Mm³/a at a rate of 1.6 m³/s from the Mokolo Dam. This will be constructed parallel to and tying in with infrastructure supplying Grootegeeluk Mine, Matimba and Medupi Power Stations and Lephalale Municipality. Phase 2 will comprise an abstraction weir in the Crocodile River, de-gritting channels with high and low lift pump stations, and a 160 km of pipeline with break pressure and balancing reservoirs. The abstraction weir has a capacity of 25.5 m³/s, and the estimated pump capacities for the low lift and high lift pumps will be 3.6 MW and 15 MW, based on an initial demand of 5.4 m³/s. The 160 km of pipeline consists of a 30 km rising main and a 120 km gravity main. Pipe diameters range from 1m to 2.3 m. The final configuration of Phase 2 is yet to be confirmed. Responsible for providing general geographic information systems (GIS) assistance to the project team and compiling maps specifically designed for the land acquisition process.

Viljoenskroon substation transmission basic assessment (BA), South Africa, Eskom Free State



Operating Unit, 08/2015 - 06/2017, Project Manager/Environmental Consultant/Geographic Information Systems (GIS) Expert

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

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

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

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

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

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

The project involved applying for the amendment of the environmental authorisation (EA) for the proposed Khanyisa Power Station and the amendment of authorisations for associated infrastructure, including a water supply pipeline, substation and transmission line. Zutari commissioned specialist studies, including air quality, stormwater, waste, noise and traffic, to address the potential environmental and social impacts of the project; compiled an amendment report summarising the change in these impacts; undertook the public participation/stakeholder engagement process and applied for the amendment of the water use licence application (WULA). Further applications included a scoping and environmental impact assessment (EIA) process for repositioning the substation and 400 kV transmission line and a basic assessment for repositioning a water supply pipeline. Responsible for geographic information systems (GIS) support to the project team.

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

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

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

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

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

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

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

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

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

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

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

Zutari was appointed to conduct the environmental basic assessment process for the proposed expansion of the existing Mabopane cemetery as it had reached full capacity. Responsible for overall

project management, public participation compilation of reports and geographic information systems (GIS).

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

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

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

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

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

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

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

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

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

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

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

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

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

Zutari was appointed to conduct the basic assessment (BA) for the proposed Vaaldam 88 kV power line near Deneysville to the T-off near Clydesdale. [Click or tap here to enter text.](#)

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

Zutari was appointed for the updating and completion of the environmental impact assessment (EIA) process for the 140 MW gas-fired generation plant in Esiama, including specialist studies for air

quality, noise, ecology and waste. An environmental permit was granted by the Ghana Environmental Protection Agency (EPA). [Click or tap here to enter text.](#)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

The project entailed the provision of full planning and engineering services for the development of Sasko's new bakery in Woodmead. Zutari provided architectural, project management, civil, structural, electrical, mechanical, fire and wet services engineering for the new bakery complex, including an ancillary administration block, a washbay and a workshop. [Click or tap here to enter text.](#)

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

Zutari was appointed for the design and construction supervision of the Vaal River Eastern Subsystem Augmentation Project (VRESAP), an emergency water transfer scheme that abstracts water from the Vaal Dam and pumps it to the Knoppiesfontein division structure over a distance of 115 km. From the division structure the water is gravitated to the Bosjesspruit and Trichardtsfontein Dams. The project, with a design capacity of 5.4 m³/s, comprised abstraction works in the Vaal Dam, a low-lift pump station and a high-lift pump station as well as a rising main. It also included a 10 MI surge tank to control dynamic transients, a concrete division structure at Knoppiesfontein, a number of road and rail crossings and various pipeline appurtenances such as in-line isolation valves and air valve and scour installations. Cathodic protection of the pipeline and a sophisticated control and instrumentation (C&I) system were also provided. Responsible for geographic information systems (GIS) support, overseeing all environmental aspects of the project, and the compilation and submission of 28 borrow pit closure plans to the Department of Minerals and Energy (DME).

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

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

Mokolo Crocodile (West) Water Augmentation Study, South Africa, Department of Water and

Sanitation (DWS), 03/2007 - 07/2013, Geographic Information Systems (GIS) Support

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Basic assessment (BA) for the Rand Water R5 pipeline between Rietvlei Dam and Mamelodi, Phase 2, South Africa, Rand Water, 01/2009 - 01/2010, Geographic Information Systems (GIS) Support Expert

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

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

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

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

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

information systems (GIS) support for the EIA process, report compilation and submission for final authorisation.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Relocation and protection of Petronet utility, South Africa, Transnet, 01/2007 - [Click or tap to enter a date.](#), Environmental Practitioner

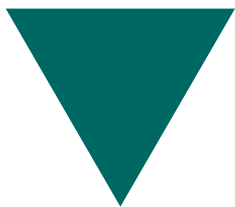
The project consisted of an environmental impact assessment (EIA) for the relocation and protection of an existing Petronet utility, which would be affected by the Gautrain Rapid Rail Link (GRRL). Responsible for liaising with the Department of Agriculture and Environmental Affairs (DAEA), bio-physical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

Anheuser-Busch InBev (AB InBev) greenfields brewery, Ghana, Anheuser-Busch InBev (AB InBev), 01/2018 - , Senior Environmental Consultant

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

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

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



Qualifications

BSc Biological and Environmental Sciences

BSc (Hons) Environmental Management

Specialisation

Environmental management, Environmental Auditing, Environmental Impact Assessments and Environmental Monitoring

8

years in industry



Candice Dürr

Environmental Practitioner

Candice is as an environmental practitioner appointed by Zutari. She specialises in environmental impact assessments and auditing and her expertise consists of risk- and impact assessments and environmental monitoring. She has experience in fieldwork for impact assessments, environmental monitoring as well as the public participation process (PPP), where, she has assisted and translated at various landowner, stakeholder and public meetings and also gained experience in environmental compliance monitoring by working on large construction projects such as the Kusile Power Station. Further significant experience includes integrated environmental management (IEM) processes such as environmental impact assessments (EIAs), basic assessment reports (BARs) and the development of environmental management programmes (EMPRs).

Candice obtained a Bachelor of Science degree in natural sciences, majoring in Geography and Zoology, from the North West University (Potchefstroom Campus), after which she completed her BSc Honours degree in Environmental Management from the University of South Africa. She has also completed a NQ level 7 course in Environmental Law from the Centre for Environmental Management and attended the Tools for Wetland Assessment course from Rhodes University in 2020.

Experience

Avondale-Gardonia 132 kV Transmission line upgrade project (Upington, Northern Cape Province, South Africa). Environmental Assessment Practitioner.

The 32km section of a 30-year old 132 kV transmission line required an upgrade from old lattice pylons structures to new monopole structures. Zutari was appointed to conduct the EIA process for the project.

Mogalakwena PV Solar Energy Facility project (Limpopo Province, South Africa). Environmental Practitioner.

Zutari was appointed to conduct the EIA process for the development of a PV solar energy facility near the Anglo American Mogalakwena Mine, in order to generate and transmit power to the mine.

Desilting of the Growthpoint stormwater control dam (Gauteng Province, South Africa). Environmental Consultant.

A small stormwater control dam is situated at the lowest point of the Growthpoint Business Park in Midrand. Over the existence of the business

park, silt has accumulated in the dam to such an extent that the dam is now filled and has virtually no capacity left. Therefore, Growthpoint intends to desilt the dam. Responsible for the compilation of the maintenance management plan, which is to be submitted to the competent authority for approval in order to authorise the regular desilting of the dam. (Growthpoint Properties).

Olifants River Water Resources Development Project - Phase 2 (Limpopo and Mpumalanga Province, South Africa). Environmental Assessment Practitioner.

The Olifants River Water Resources Development Project (ORWRD) Phase 2 is the continuation of the previous bulk water pipeline phases to deliver water from the new De Hoop dam to surrounding areas. Responsible for borrow pit license applications, updating of the environmental management plan (EMP) and updating the environmental technical specifications document. (TCTA on behalf of Department of Water and Sanitation).

Mogalakwena Local Municipality - various overhead line (OHL) projects (Limpopo Province, South Africa). Environmental Consultant.

The Municipality appointed Aurecon to conduct a screening and pre-feasibility exercise to determine whether overhead power lines can be constructed in the area. Responsible for compilation of the screening report in terms of the environmental requirements that the proposed project would require. (Mogalakwena Local Municipality).

Environmental impact assessment (EIA) for 140 MW Esiamas gas-fired generation plant (Western and Ashanti Region, Ghana). Environmental Consultant.

The project entailed the update and completion of the environmental impact assessment (EIA) process for the 140 MW gas-fired generation plant in Esiamas in Ghana. This included specialist studies for air quality, noise, ecology and waste. Responsible for update and completion of the EIA process and submission to the Ghana EPA who granted the environmental permit. (Aggreko International Project).

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

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

Mabopane Cemetery expansion basic assessment report (BAR) (Gauteng Province, South Africa). Environmental Consultant.

Aurecon was appointed to compile a report on the Basic Assessment Process in terms of the National Environmental Management Act (No 107 of 1998) for the proposed expansion of the existing Mabopane Cemetery. Responsible for the compilation of the project's environmental management programme (EMPr). (City of Tshwane).

Pomona extension 186 (Gauteng Province, South Africa). Environmental Consultant.

Aurecon provided environmentally sustainable design (ESD) and mechanical services for development of a contemporary warehouse with an office component pursuing a Green Star certification. Responsible for compilation of the project's environmental management plan (EMP). (Mont Blanc Projects & Properties (MBPP)).

Kimberley-Homestead power line (Northern Cape Province, South Africa). Environmental control officer (reviewer).

Aurecon provided environmental control officer services for the construction of a 132 kV distribution power-line from Kimberley to Homestead. Responsible for review of the on-site ECO reports. (Eskom Holdings).

Klipplaats 400 kV line deviation (Mpumalanga Province, South Africa). Environmental Assessment Practitioner.

The project entailed environmental studies, a water use license application and preliminary design for the Klipplaats 400 kV deviation at the Tweefontein Coal Mine. Responsible for compilation and submission of the basic assessment report, public participation practitioner. (Glencore Xstrata Coal South Africa).

Shisha Bridge basic assessment (Limpopo Province, South Africa). Environmental Assessment Practitioner (reviewer).

Aurecon provided environmental services on the NEMA basic assessment process for the repair and upgrading of the Shisha River low level bridge. Responsible for reviewing the environmental management plan (EMP) for the project. (Gibb Engineering & Science PTA).

Novartis Head Office (Gauteng Province, South Africa). Environmental Control Officer (ECO)/Environmental Consultant.

The project comprised environmentally sustainable design (ESD) services and leadership in energy and environmental design (LEED) submission for the new Novartis Head Office in Waterfall City, Midrand. Responsible for compiling the environmental management plan (EMP) and conducted monthly ECO audits to audit compliance of the project with the EMP. Also compiled the erosion and sedimentation control (ESC) plan for submission. (Atterbury Waterfall Investment).

Rooiberg landfill waste management licence applications (Limpopo Province, South Africa). Environmental Assessment Practitioner.

Aurecon was appointed to conduct the waste license application process to license the Rooiberg waste disposal facility. Responsible for compiling the basic assessment report, public participation and waste license application forms. (Department of Environmental Affairs (DEA)).

Mechanical and environmentally sustainable design (ESD) for the new Discovery head office in Sandton (Gauteng Province, South Africa). Environmental Control Officer (ECO)/Environmental Consultant.

Aurecon was contracted to provide mechanical and environmentally sustainable design (ESD) on the new head office for Discovery in Sandton. This resource-efficient and cost-effective building, developed in joint venture by Growthpoint Properties Limited and Zenprop Property Holdings, is one of the largest single commercial office developments in Africa. There are existing buildings in the proposed development area which will be demolished. Extensive earth works and lateral support will also form part of the construction phase related to the development. Responsible for compiling the environmental management plan (EMP) and conducting monthly ECO audits to audit compliance of the project with the EMP. Also compiled the MAN-6 short report which is a correlation report between the EMP and the requirements of the New South Wales guidelines. (Growthpoint Properties).

Amersfoort Abattoir (Mpumalanga Province, South Africa). Environmental Assessment Practitioner (reviewer).

The proposed poultry abattoir will be designed to a capacity that will allow for a slaughter of 150 000 broilers per week. Aurecon was appointed by the Mpumalanga Department of Agriculture, Rural Development, and Land Administration (DARDLA) through Royal Harkening who are acting as the engineering consultants on this proposed project, to conduct the environmental impact assessment (EIA) for the proposed Amersfoort Poultry Abattoir located to the south of Ezamokuhle Township. Responsible for reviewing the environmental management plan (EMP) for the project. (Royal HaskoningDHV).

Servitudes and environmental management plan (EMP) for transmission line construction (Mpumalanga Province, South Africa). Environmental Assessment Practitioner.

Aurecon's appointment entails the acquisition of options to register servitudes over land within an environmentally approved corridor for 2 x 400 kV transmission lines for a distance of 119.611 km from Matla Power Station near Secunda, Mpumalanga Province to Jupiter B Substation, in the vicinity of

Rosherville, Gauteng Province and the management of the environmental management plan (EMP) during construction of the corridor on behalf of Eskom. Responsible for the compilation of the construction and operational management plan. (Eskom Holdings SOC Limited).

Basic assessment (BA) and environmental management plan (EMP) for the Pangaea/Kanga 88 kV power lines (Mpumalanga Province, South Africa). Environmental Assessment Practitioner.

Eskom proposed the establishment of two 88 kV substations (Pangaea and Kanga) and two 88 kV loop-in, loop-out lines from the existing 88 kV Erasmus-Arbor line in order to ensure electric supply for the upcoming Kusile Railway Line. Aurecon was appointed to conduct a basic assessment for the proposed routes chosen for the construction of the power lines. Responsible for environmental assessments and author of the environmental management plan (EMP). (Eskom Distribution).

Site specific environmental management plan (EMP) and water use license (WUL) compilation for the Umfolozi-Mbewu power line and new substation (KwaZulu-Natal Province, South Africa). Author of the Environmental Management Plan (EMP).

After undergoing the necessary environmental impact assessments (EIAs) and stakeholder engagement processes, Eskom Transmission received environmental authorisation (EA) (Ref: 12/12/20/881) from the National Department of Environmental Affairs (DEA) to construct a 765 kV transmission line between the proposed new Mbevu substation near Empangeni to the existing Umfolozi substation near Ulundi in the Zululand and Uthungula District Municipality. Aurecon was appointed to assist in the compilation of the required environmental management plan (EMP) and to submit the plan to the department for approval, after which it will form part of the environmental obligations of Eskom and its appointed contractors during the construction phase of the project. Responsible for compiling the site specific environmental management plan (EMP). (Eskom Holdings Ltd).

Bathlako Mine annual environmental management plan (EMP) audit (North West Province, South Africa). External Auditor.

Bathlako Mining appointed Aurecon as external environmental auditor. The audit entailed providing an assessment of the effectiveness of the measures taken by the authorisation holder (Bathlako Mine) to comply with the requirements set out in the approved environmental management plan (EMP). Responsible for auditing the mine against the approved EMP requirements. (Bathlako Mining Ltd).

Environmental services for the demolition and construction of the Illovo Edge III Project (Gauteng Province, South Africa). Environmental Control Officer (ECO)/Environmental Consultant.

The project entailed the provision of environmentally sustainable design (ESD) services to help Mont Blanc Projects & Properties (MBPP) in achieving a Green Star SA Rating for Phase 3 of the Illovo Edge office development. Responsible for the compilation of an EMP and a MAN-06 correlation report. (Mont Blanc Projects & Properties (MBPP)).

Environmental impact assessment (EIA) for the Swaziland Rail Link Project (South Africa and Swaziland). Environmental Assessment Practitioner.

Aurecon was appointed to provide environmental services for the required environmental impact assessment (EIA) for the proposed Swaziland Rail Link, which runs from Davel to Nerston in Mpumalanga, through Swaziland, to Nsezi in Richards Bay, KwaZulu-Natal. The aim of the project is to unlock the potential of a multinational strategic rail corridor and divert general freight traffic off the dedicated heavy haul Richards Bay coal line. The project activities consists of various works, including the upgrading of existing railway sections (including rebuilding certain sections), construction of an entirely new rail link from Lothair to Sidvokodvo in Swaziland and the construction of new rail yards. Responsible for environmental assessments, compiling the EIA reports and authoring the environmental management plans (EMPs) for the project. (Transnet Capital Project (TCP)).

Menlyn Park Shopping Centre reconfiguration, Phase 1 and 2 (Gauteng Province, South Africa). Environmental Control Officer (ECO)/Environmental Consultant.

Aurecon has been the consulting engineers on Menlyn Shopping Centre since 1998 and has been involved in all upgrades and alterations ever since. The recent reconfiguration of the mall includes the expansion and refurbishment of the facility. Aurecon was contracted to provide heating, ventilation and air conditioning (HVAC); civil and structural services for this project. Responsible for the compilation of an EMP and a MAN-06 correlation report. (Old Mutual).

Environmentally sustainable design (ESD) for the Maxwell Office Park (Gauteng Province, South Africa). Environmental Control Officer (ECO).

Aurecon was appointed as the environmentally sustainable design (ESD) consultants for several buildings in the Maxwell Office Park in Midrand. The 4-Star green rated buildings comprise three storeys and include a number of sustainable features. Responsible for conducting weekly site visits and monthly environmental management plan (EMP) audits as independent environmental control officer (ECO). (Atterbury Properties).

Design of Atholl Towers office development (Gauteng Province, South Africa). Environmental Control Officer (ECO).

The project involved the environmentally sustainable design (ESD) for the Atholl Towers office development between Katherine and Patricia Streets in Atholl. Aurecon has been appointed as the ESD consultants and landscape architects. Responsible as independent environmental control officer (ECO) for conducting monthly environmental management plan (EMP) audits and compiling MAN-06 short correlation reports for green star submission. (BLW Properties).

Environmental services for the demolition and refurbishment of the Atrium on 5th Project (Gauteng Province, South Africa). Environmental Control Officer (ECO)/Environmental Consultant.

The project comprised the refurbishment and upgrading of the 10-storey Atrium on 5th's concrete office block in Sandton central business district (CBD) to a more modern-looking building by erecting a new glass façade. Aurecon is providing the structural engineering and environmentally sustainable design (ESD) services for the Atrium on 5th project. Atrium on 5th has been awarded a Green Star Office v1 Design rating by the Green Building Council of South Africa (GBCSA). Responsible for conducting monthly environmental management plan (EMP) audits as well as the compilation of an EMP and a MAN-06 correlation report. (Liberty Properties).

Design and construction of a new office building for the Department of Government Communication and Information System (GCIS) (Gauteng Province, South Africa). Environmental Control Officer (ECO).

The project entailed the design and construction of a new multi-storey office building For the Government Communication and Information System (GCIS) in Hatfield. The building design achieved a 4-Star Green rating from the Green Building Council of South Africa (GBCSA). Responsible for conducting monthly environmental management plan (EMP) audits as independent environmental control officer (ECO). (Growthpoint Properties).

8 Melville Road Office building (Sandton, Gauteng, South Africa). Environmental Control Officer (ECO).

The project entailed the design and construction of a green building in Sandton. Responsible for conducting monthly environmental management plan (EMP) audits. (Intaprop (Pty) Ltd).

Environmentally sustainable design (ESD) consultant for Lakeside Office Park, Block 3 (Gauteng Province, South Africa). Environmental Control Officer (ECO).

The major refurbishment of the building was undertaken by Growthpoint Properties in collaboration with AMA Architects. Aurecon was appointed as the environmentally sustainable design (ESD) consultant for the refurbishment of the Lakeside Office Park, Block 3. The building won the SAPOA 2013 Overall Green Award. Responsible for conducting monthly environmental management plan (EMP) audits. (Growthpoint Properties).

Environmental services for the construction of the USAID additional office space project (Gauteng Province, South Africa). Environmental Control Officer (ECO)/Environmental Consultant.

USAID undertook the design and construction of additional office space for the proposed expansion of USAID and other US Government Agencies operations in Southern Africa. USAID Southern Africa is situated on a 3.5 hectare portion in the Groenkloof area in Pretoria. Responsible for conducting monthly environmental management plan (EMP) audits as well as the compilation of an EMP and a MAN-06 correlation report. (CJ Irons).

Redevelopment of a warehouse and office building for Grundfos (Gauteng Province, South Africa). Environmental Control Officer (ECO).

Aurecon was appointed to provide engineering services, environmentally sustainable design (ESD) and act as the principal agent for the redevelopment of a warehouse of approximately 6 300 m² and an office building of approximately 3 300 m² for Grundfos. Responsible for conducting monthly environmental management plan (EMP) audits as independent environmental control officer (ECO). (Growthpoint Properties).

Construction of MTC Office building (Gauteng Province, South Africa). Environmental Control Officer (ECO).

The project involved the construction of a new building for Gautrain's Head Offices in Midrand. Aurecon was appointed for the environmentally sustainable design (ESD) and landscape architecture for the building and the streetscape design linking the building with the station. Responsible for conducting monthly environmental management plan (EMP) audits. (Growthpoint Properties).

Environmental control officer (ECO) services for the construction of Umtu substation and power line (Northern Cape Province, South Africa). Environmental Control Officer (ECO).

Kalahari Resources (Pty) Ltd (Kalagadi Manganese) made an application to Eskom Distribution for the provision of a new substation at the Kalahari Resources Umtu site in order to supply the power required for new manganese mine and sinter plant situated in close proximity to Hotazel, on Farm Umtu No. 281, in the Kgalagadi District Municipality. Following this, Eskom identified the Kalahari Resources application as an opportunity to strengthen the Hotazel Distribution network by building a new 132 kV line from the new substation at the Umtu site through to Hotazel distribution substation. Responsible for monitoring and auditing the environmental management plan (EMP) on a bi-weekly basis. (Eskom Distribution).

Lynnwood Bridge office building, Phase 3 (Gauteng Province, South Africa). Environmental Control Officer (ECO)/Environmental Consultant.

This project comprised the provision of engineering services for the third phase of the development of the Lynnwood Bridge office building. Responsible for conducting monthly environmental management plan (EMP) audits as well as the compilation of an EMP, a watercourse management plan (WMP) and a MAN-06 correlation report. (Atterbury Properties).

Ingula pumped storage scheme (KwaZulu-Natal Province, South Africa). Environmental Consultant.

The Eskom Ingula PSS project will utilise surplus electricity that is generated during off-peak hours to pump water from the lower to the upper reservoir where the water is released again during peak load hours to generate wanted electricity. Eskom holds a water use license (WUL) for this project. Aurecon was appointed to conduct annual auditing of the compliance to this license. Responsible as external auditor for auditing of the WUL in 2014 and 2015. (Eskom Holdings SOC Limited).

Engineering services for the new Hyundai headquarters (Gauteng Province, South Africa). Environmental Control Officer (ECO).

The client required a cost-effective design that meets the requirements of a 4-Star Green Star SA - Office Design v1 rating for the Hyundai Automotive headquarters in Bedfordview. Aurecon was engaged to provide a wide range of innovative engineering services for this environmentally-friendly

building. Responsible for conducting monthly environmental management plan (EMP) audits. (M&F Giuricich Developments (Pty) Ltd).

Ash disposal facility (Mpumalanga Province, South Africa). Environmental Consultant.

The project was concerned with a 60-year ash disposal facility for the Kusile Power Station Project in Balmoral. Responsible for ensuring sufficient and complete environmental impact assessment (EIA) process and the water use licence application (WULA). (Eskom).

CONCO construction monitoring (Mpumalanga Province, South Africa). Environmental Officer.

CONCO appointed Aurecon to act as the contractor's environmental officer for the construction of the 400 kV loops. Responsible as relief environmental officer representing the contractor in ensuring all environmental requirements are implemented on site. (Consolidated Power Projects (Pty) Ltd (CONCO)).

Environmental impact assessment (EIA) and route determination for the Duvha-Minerva line deviation (Mpumalanga Province, South Africa). Environmental Advisor.

The project entailed an environmental impact assessment (EIA) and route determination for the deviation of the existing 400 kV Duvha-Minerva transmission line in order to clear the mining rights area for Anglo Coal. Responsible for advising on all aspects of the EIA as well as the determination of the most feasible route; assessing the need for a water use license (WUL) and monitoring and reviewing the progress of consultants performing the assessments. Also responsible for integration with Anglo Coal regarding scheduling issues, servitude agreements and environmental issues. (Eskom Group Capital/Transmission).

Co-disposal ash/gypsum facility (Mpumalanga Province, South Africa). Environmental Advisor.

The project was concerned with a co-disposal facility of ash and gypsum for the flue-gas desulfurization (FGD) system of the Kusile Power Station Project. Responsible for environmental assessment gap analysis, in collaboration with environmental lawyers, to determine whether the disposal facility has obtained sufficient authorisation to commence with both construction and operation. Also responsible for obtaining water use licence (WUL) and integrated waste management licence. (Eskom Group Capital/Transmission).

Kusile Railway Line (Mpumalanga Province, South Africa). Environmental Consultant.

The project was concerned with a 24 km railway line siding from the existing Pretoria-Witbank line to Kusile Power Station for the transportation of limestone. Responsible for ensuring sufficient and complete environmental impact assessment (EIA) process and the water use licence application (WULA). (Eskom).

Duplication of the Vlakfontein-Mamelodi pipeline, Phase 2 (Gauteng Province, South Africa). Environmental Consultant.

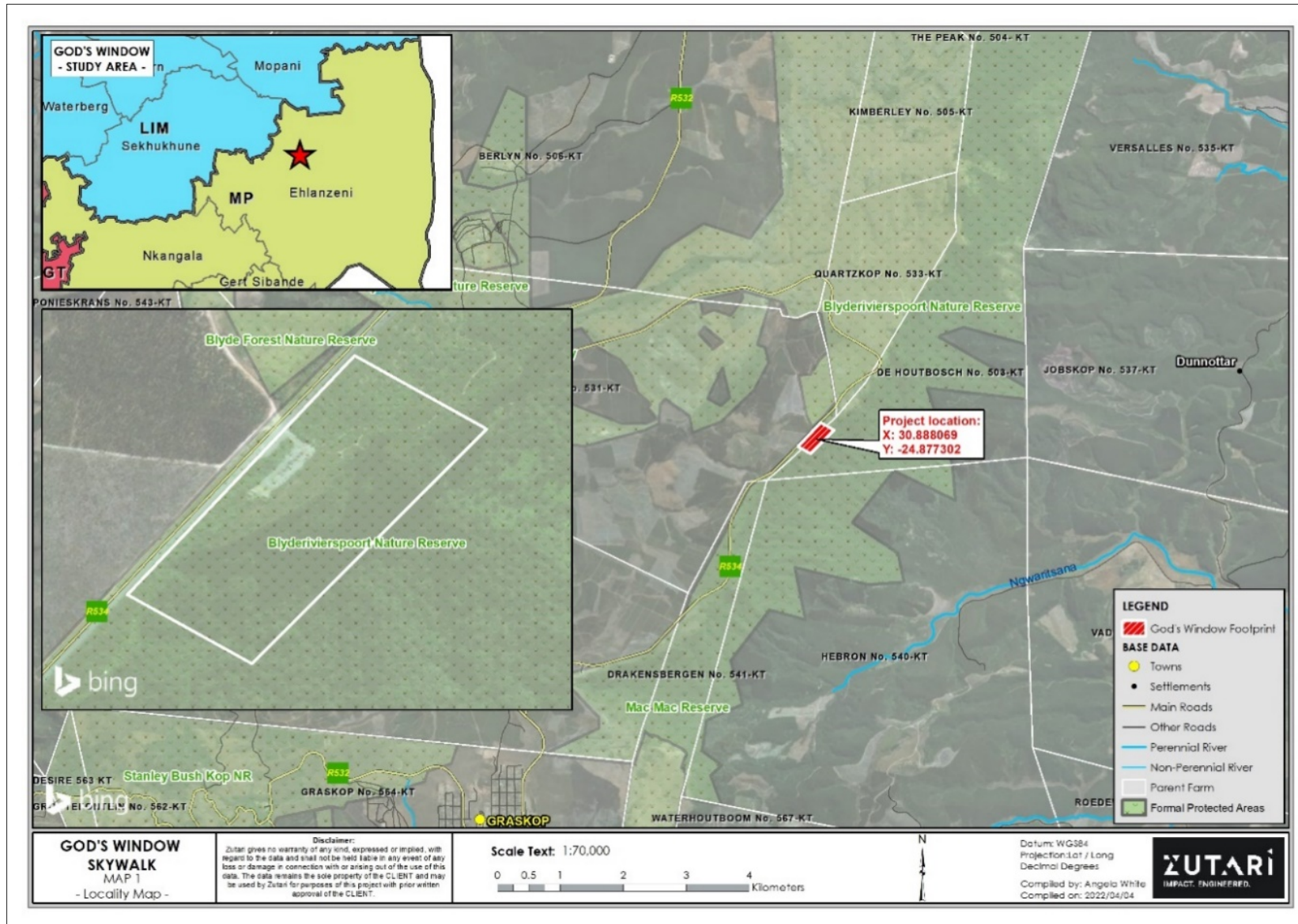
The project involved the duplication of a 52 km water supply pipeline, routed adjacent to the existing Rynfield-Mamelodi R1 and H26 pipelines, within the existing servitudes from Vlakfontein to Mamelodi. Responsible for the compilation and submission of water use licence applications (WULAs). (Rand Water).

Augmentation of the Moreleta outfall sewer (Gauteng Province, South Africa). Environmental Control Officer (ECO).

The Moreleta Spruit outfall sewer had insufficient capacity to handle the flow of sewage, resulting in regular spillage of raw effluent. Aurecon was appointed for the feasibility and preliminary design of the Moreleta Spruit outfall sewer to determine the most viable option for refurbishment and upgrading. The detailed design, environmental impact assessment (EIA), geotechnical investigation and project risk assessment of the required works were completed in Phases 1 and 2. Phase 3 involved the rehabilitation of outfall/collector sewer pipes in the Moreleta Spruit catchment area. Responsible for conducting monthly environmental management plan (EMP) audits as independent environmental control officer (ECO). (City of Tshwane).

Appendix B: Fossil Chance Find Protocol

Appendix C: Locality Map



In diversity there is beauty
and there is strength.

MAYA ANGELOU

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