PROPOSED HYDROPOWER STATION ON THE FARM RIEMVASMAAK (REMAINDER OF FARM NO. 497 AND PORTION 1 OF FARM NO. 498) ON THE ORANGE RIVER, NORTHERN CAPE

SOCIO-ECONOMIC IMPACT ASSESSMENT

Specialist Study Report (Revision 4)

EOH Environmental and Coastal Services

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Specialist Study Report (Revision 4)

Prepared for:

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EXECUTIVE SUMMARY

Introduction

RVM 1 Hydro Electric Power (Pty) Ltd intends to construct a 40 Megawatt (MW) hydropower station on the Orange River. It is proposed that the development take place on the farm Riemvasmaak (Portion 1 of Farm no. 498 and Remainder of Farm no. 497), north of the Augrabies Falls, approximately 40 km north-west of Kakamas in the Northern Cape Province of South Africa.

Aurecon South Africa (Pty) Ltd (Aurecon) was appointed by RVM 1 Hydro Electric Power (Pty) Ltd to undertake the requisite environmental authorisation process for the proposed project as required in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998). In this regard, Aurecon appointed ACER (Africa) Environmental Management Consultants (ACER) to undertake this specialist study (which is one of a suite of specialist studies that has been commissioned to understand the potential environmental issues and associated impacts arising from the proposed project). Following the completion and acceptance of the Final Scoping Report by the Department of Envionmental Affairs, EOH Coastal and Environmental Services were appointed to undertake the Environmental Impact Assessment Phase of the project.

Purpose and scope of specialist study report

This report aims to provide the outcomes of the assessment of the socio-economic sensitivities and impacts likely to arise as a result of the proposed development. In addition, the report provides the outcomes of the assessment of the impacts that the project is likely to have on the tourism sector in the area. The following scope of work was provided:

- Undertake a baseline socio-economic analysis to provide an understanding of the current socio-economic environment.
- Describe and evaluate the potential socio-economic impacts, including cumulative impacts, of construction, operation, and maintenance of the proposed development on the socio-economic environment, in terms of the scale, magnitude and the duration of impact.
- Recommend mitigation measures to ameliorate negative and to enhance positive impacts.
- Provide comment on the impact on tourism, using the existing Tourism Study (compiled for the proposed project) as a basis.

Legal aspects

Applicable legislation

The following legislation and associated regulations are relevant to this socio-economic and tourism impact assessment:

- Constitution of the Republic of South Africa Act, 1996 (Act No. 108 of 1996) as amended.
- National Environmental Management Act, 1998 (NEMA) (Act No. 107 of 1998) as amended.
- National Heritage Resources Act, 1999 (Act No. 25 of 1999).

International safeguards

- The IFC's Policy and Performance Standards on Social and Environmental Sustainability.
- Equator Principles.
- Hydropower Sustainability Assessment Protocol.

National safeguards

- Independent Power Producer (IPP) Procurement Programme (Vol. 5 Economic Development Requirements).

Project description

The proposed project will consist of the following components, the majority of which will be constructed underground.

Project components

- A low diversion weir across the Orange River upstream of the Augrabies Falls.
- An off-take structure at the weir to facilitate diversion of water from the river.
- An underground conduit – the headrace - to convey water from the intake structure to the penstock head pond.
- A head pond and power station intake structure - forebay.
- Vertical (or very steep) penstocks – pipes - to transfer the water from the head pond to the power chamber.
- An underground power chamber containing up to four Francis turbines.
- An underground tailrace and outlet works to convey water from the power chamber back to the river channel.
- A haulage way and/or haul roads to facilitate access for construction and the removal of excavated material off site for disposal or re-use.
- A high voltage (HV) power line to evacuate the power from the power station to the national grid.
- A transformer yard and mini substation located at the headpond and a new substation.
- Fencing as required for public safety.

Methodology

Both qualitative and quantitative data analysis techniques were applied (using primary and secondary data sources) in order to successfully undertake the socio-economic and tourism impact assessment.

Secondary data sources were used primarily to conduct the baseline socio-economic study of the area. Primary data were gathered during field work for the duration of one week (16 - 20 September 2013). The use of both secondary and primary data as well as quantitative and qualitative data allowed for the triangulation of findings.

The impact assessment has been undertaken using conventions and criteria provided by Aurecon:

- Scale of impact (local, regional or national).
- Magnitude of impact (low, medium or high).
- Duration of impact (construction (±3 years), medium term (up to 10 years after construction) or long term (more than 10 years after construction)).

Assumptions and limitations and gaps in knowledge

Assumptions

- The information and data provided by RVM1 and Hydro SA are correct and accurate.
- The information provided by Augrabies Falls National Park is accurate.
- The information provided by the Department of Water and Sanitation is accurate.
- The social impact identified and assessed will not vary depending on the alternative alignments, unless otherwise stated.
- The information provided herein will be adequate for effective decision-making in the EIA.

Limitations and gaps in knowledge

- When the site visit was conducted, land owners affected by the transmission lines outside the project site had not been consulted because the servitude rights were still under negotiation. As such, the affected landowners were not communicated with during this time. However, the affected land owners have since been consulted and it is understood that no concerns have been raised at this stage.

- When the site visit was conducted, the 'Spoil Transport Alternatives' and the 'Spoil Disposal Alternatives' had not been confirmed. In this regard, these assessments have been conducted using Google Earth imagery and knowledge of the study area gained during the site visit.

Study area

Riemvasmaak

Riemvasmaak lies approximately 15 km north-east of the AFNP. The Riemvasmaak community was forcibly removed from their land in 1973 and 1974 under unjust Apartheid policies. During discussions with members of the local community, the ward councillor and local government officials, issues such as high unemployment, poor levels of education and few employment opportunities were identified as the major challenges facing the community.

Augrabies

Augrabies is a small town in the Northern Cape province of South Africa, situated on the banks of the Orange River about 100 km downstream from Upington and immediately outside the AFNP. During discussions with various community members from Augrabies, local government officials and ward councillors, a number of challenges facing the community were identified, including high levels of unemployment and poverty, high level of illiteracy and few opportunities.

Augrabies Falls National Park

AFNP is located about 120 km west of Upington. It covers an area of 820 km² and stretches along the Orange River. The waterfall is approximately 56 m high and is awe-inspiring when the river is in flood.

Description of the receiving environment

The receiving environment is described in terms of:

- Population.
- Education.
- Economic sectors.
- Employment.
- Access to basic services.
  - Access to piped water.
  - Access to sanitation.
  - Access to electricity.
- Access to healthcare.

In summary, there are numerous social and economic challenges being faced within the broader project area, especially relating to access to education, in particular secondary and tertiary education and skills development. In accordance with the IPP Procurement Program, there are various socio-economic development requirements among other development imperatives with which the project proponent needs to abide. The serious lack of development in the area presents numerous opportunities for such development.

Description of findings

Social change processes

These are addressed in terms of:

- Demographic processes.
- Economic processes.
- Emancipatory and empowerment processes.
- Socio-cultural processes.

Social impacts – preconstruction and construction phase

These are addressed as follows:

- Health and social wellbeing.
  - Increased spread in disease.
    - Without mitigation – Low.
    - With mitigation – Very Low.
  - Reduced road safety.
    - Without mitigation – Medium.
    - With mitigation – Low.
  - Potential for accidents on site.
    - Without mitigation – Medium.
    - With mitigation – Low.
- Quality of the living environment.
  - Increased pressure on existing infrastructure and services.
    - Without mitigation – Medium.
    - With mitigation – Low.
  - Increased dust.
    - Without mitigation – Medium.
    - With mitigation – Low.
  - Increased criminal activity.
    - Without mitigation – Low.
    - With mitigation – Very low.
  - Increased fire hazard.
    - Without mitigation – Medium.
    - With mitigation – Low.
- Cultural impacts.
  - Cultural heritage.
    - Without mitigation – Medium.
    - With mitigation – Low.
- Sense of place.
  - Increased noise.
    - Without mitigation – Medium.
    - With mitigation – Low.
  - Aesthetic impacts.
    - Without mitigation – Low.
    - With mitigation – Very low.
- Economic impacts and material wellbeing.
  - Increased employment opportunities.
    - Without management – Medium.
    - With management – High.
  - Financial benefits for the Riemvasmaak Community Trust (RCT).
    - Without management – Medium.
    - With management – High.
  - Increased opportunities for Small and Medium Enterprises (SMEs).
    - Without management – Low.
    - With management – Medium.
  - Increased opportunities for informal traders.
    - Without management – Very low.
    - With management – Low.
  - Temporary and permanent loss of land.
    - Without mitigation – Low.
    - With mitigation – Very low.

- Temporary disruption to farming activities.
  - Without mitigation – Low.
  - With mitigation – Very low.

Socio-economic impacts – operational phase
These are addressed as follows:

- Quality of the living environment.
  - Increased dust.
    - Without mitigation – Very low.
    - With mitigation – Very low.
- Cultural impacts.
  - Cultural heritage.
    - Without mitigation – Medium.
    - With mitigation – Low.
- Sense of place.
  - Increased noise.
    - Without mitigation – Low.
    - With mitigation – Very low.
  - Aesthetic impacts.
    - Without mitigation – Low.
    - With mitigation – Very low.
- Economic impacts and material wellbeing.
  - Increased employment opportunities.
    - Without management – Medium.
    - With management – Medium.
  - Establishment of a Broad based community trust.
    - Without management – High.
    - With management – High.
  - Socio-Economic Development (SED) Spend.
    - Without management – High.
    - With management – High.
  - Financial benefits for the RCT.
    - Without management – High.
    - With management – High.
  - Improved energy production.
    - Without management – Medium.
    - With management – Medium.

Tourism
Tourism is identified in the ZF Mgcawu District IDP and Kai !Garib Local Municipal IDP as one of the most important sectors for both the district and provincial economy, with it being noted that tourism was the fastest growing sector in the municipality between 2007 and 2011 (Siyanda IDP, 2013 – 2014). The Kai !Garib Local Municipality has identified the tourism sector as one with significant potential for growth which needs to be exploited.

Impacts on tourism – construction phase
These are addressed as follows:

- Negative impact on tourism.
  - Without mitigation – Medium.
  - With mitigation – Low.

Impacts on tourism – operational phase
These are addressed as follows:

- Negative impact on tourism.
  - Without mitigation – Medium.
  - With mitigation – Low.
- Increased tourism opportunities.
  - Without management – Very Low.
  - With management – Low.

Benefit sharing
Through the assessment of the socio-economic conditions prevailing in the study area and discussions with the Kai !Garib Local Municipality LED and tourism officer, members of the Augrabies community, members of the Riemvasmaak community, and the acting chairperson and trustees of the RCT, the following benefit sharing options have been identified.

- Support for existing projects.
- Education.
- Training and skills.
- Need for the construction of public spaces and sports fields.
- Provision of services.

Conclusions and recommendations
Conclusions

RVM 1 Hydro Electric Power (Pty) Ltd intends to construct a 40 MW hydropower station on the Orange River. It is proposed that the development takes place on the farm Riemvasmaak (Portion 1 of Farm no. 498) and Remainder of Farm no. 497) north of the Augrabies Falls, approximately 40 km north-west of Kakamas in the Northern Cape Province of South Africa. Access to the land for the proposed project is controlled by the AFNP. In an effort to reduce the impact on the adjacent AFNP, the majority of the project infrastructure will be buried underground while the weir has been designed in such a manner to ensure that a minimum flow of 30m³/s, assuming that there is this amount of water in the river, will always be channelled to the falls.

The surrounding socio-economic environment is characterised by high levels of poverty and unemployment while there is generally poor access to services including education and, in particular, tertiary education. In line with the IPP Procurement Process, the project proponent is required to satisfy a number of economic development requirements, ranging from local ownership of the project and preferential procurement to enterprise and socio-economic development. In addition, it is anticipated that the project will generate in the region of 150 – 200 temporary jobs during the construction process, expected to last approximately 36 months. The majority of these jobs will be sourced from the local communities. In communities where unemployment and poverty levels are high, the possibility of employment for 36 months is of significant benefit to the local population. During the operating phase of the project, it is anticipated that between five and ten permanent jobs will be created. Following the required training, only one of the permanent jobs would not be local. If the project is managed correctly, there is potential for the socio-economic benefits of the project to be far reaching and sustainable, and continue to benefit future generations.

On completion of this study, it can be confirmed that there are no fatal flaw or potential red flags from a socio-economic perspective (nevertheless, sensitivity needs to be applied to visual and noise aspects). There are, however, likely to be various negative impacts associated with the proposed project especially considering its location adjacent to a National Park. The biggest concern raised by Interested and Affected Parties was the impact that a slightly reduced flow would have on the

Augrabies Falls and, therefore, its attraction to tourists. However, it should be noted that through this research it has been established that the only direct correlation between flow volumes and visitors to the park is during times of flood. As such, the impact of a slight decrease in volume of water passing over the falls is unlikely to impact tourism. Of greater concern are issues such as the impact of noise, dust and aesthetic impacts on the park during the construction process and the impact which these may have on current and future tourism. These impacts also need to be considered for the community at large. As such, recommendations have been made.

Recommendations

While all impacts identified should be mitigated as far as possible, it is recommended that specific attention is paid to the following points:

Employment creation

Jobs should be sourced locally and in line with the IPP Procurement Programme. In addition, every effort should be made to ensure that skills development takes place in order to enable permanent employment positions to be filled by members of the local community. A community liaison officer needs to be appointed in order to mediate between the contractor and/or the project proponent and the local communities.

Economic benefits

Measures need to be put in place to ensure that the income generated for the RCT from rental and dividends is put towards the upliftment of the community at large.

Visual impacts

Efforts should be made to ensure that visual impacts are kept to a minimum during the construction process and during the operational phase of the project. Of particular concern is the proposed location of the new sub-station which is currently adjacent to the RCT land boundary. It is strongly recommended that an alternative site be identified further from the boundary to prevent any visual impact the sub-station may have on future tourism development for this area. The same applies for the proposed 132 kV transmission lines. At present it is planned that the transmission lines will surface adjacent to the RCT land boundary. In terms of the potential visual impact it is proposed that these lines continue underground for a small distance before surfacing in order to create a buffer between the AFNP and the electrical infrastructure.

Noise

It is understood that a noise impact study has been conducted for the proposed project and found that considering the distance from noise sensitive receptors it was deemed of little significance, in particular because the power house will be underground.

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ABBREVIATIONS AND ACRONYMS

ACER	ACER (Africa) Environmental Management Consultants
AFNP	Augrabies Falls National Park
Aurecon	Aurecon South Africa (Pty) Ltd
CMMC	Community Management and Monitoring Committee
DoE	South Africa Department of Energy
EFR	Environmental Flow Requirement
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EPFI	Equator Principle Financial Institutions
I&APs	Interested and affected parties
IDP	Integrated Development Plan
IPP	Independent Power Producer
LM	Local Municipality
MW	Megawatt
NEMA	National Environmental Management Act, 1998
RCT	Riemvasmaak Community Trust
SANParks	South African National Park
SMEs	Small and Medium Enterprises
StatsSA	Statistics South Africa

AUTHORS

The Socio-economic and Tourism Impact Assessment was undertaken by Mr DN Keal (ACER (Africa) Environmental Management Consultants) (ACER) who is also the principle author of this Specialist Study Report. The assignment was undertaken under the direction of Dr R-D Heinsohn (ACER) who also conducted an internal review of this report.

DECLARATION OF INDEPENDENCE

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	12/12/20/
NEAS Reference Number:	DEAT/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010

PROJECT TITLE

Proposed hydropower station on the farm Riemvasmaak (remainder of farm No. 497 and portion of farm no. 498) on the Orange River in the Augrabies Falls National Park, Northern Cape

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The specialist appointed in terms of the Regulations

I **Duncan Keal** declare that --

General declaration:

- I act as the independent specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity
- I will comply with the Act, regulations and all other applicable legislation
- I have no, and will not engage in, conflicting interests in the undertaking of the activity
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority
- all the particulars furnished by me in this form are true and correct
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act

Signature of the specialist:

ACER (Africa) Environmental Management Consultants

Name of company (if applicable):

10/01/2014

Date:

1. INTRODUCTION

1.1 Background

RVM 1 Hydro Electric Power (Pty) Ltd intends to construct a 40 Megawatt (MW) hydropower station on the Orange River. It is proposed that the development take place on the farm Riemvasmaak (Portion 1 of Farm no. 498) and Remainder of Farm no. 497, approximately 40 km north-west of Kakamas in the Northern Cape Province of South Africa (Figure 1).

The farm of Riemvasmaak (Portion1 of Farm No. 498) and Remainder of Farm no. 497 are managed by the Augrabies Falls National Park (AFNP). The Riemvasmaak farm (Portion 1 of Farm No. 498) land was returned to the Riemvasmaak community following the first successful land restitution claim after the first democratic elections in the country in 1994. The land had originally been taken by the former National Party Government during Apartheid, with the communities forcibly removed in 1973/74.

Aurecon South Africa (Pty) Ltd (Aurecon) was initially appointed by RVM 1 Hydro Electric Power (Pty) Ltd to undertake the requisite environmental authorisation process for the proposed project as required in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998). While a Basic Assessment process was initially undertaken changes in the requirements of the Department of Energy's Independent Power Producer process allowed for larger hydropower projects to be put forward which required the upgrading the environmental authorisation process to a full Scoping and Environmental Impact Assessment (EIA). The Final Scoping Report was submitted to the Department of Environmental Affairs in September 2013 and accepted in Octeber 2013. Up to this point, Aurecon was the appointed Environmental Assessment Practitioner. Moving into the Environmental Impact Assessment phase of the project, EOH Coastal and Environmental Services took over as the Environmental Assessment Practitioner.

Considering the nature and location of the project, the need for a socio-economic and tourism impact assessment was identified. In this regard, Aurecon appointed ACER (Africa) Environmental Management Consultants (ACER) to undertake this specialist study (which is one of a suite of specialist studies that has been commissioned to understand the potential environmental issues and associated impacts arising from the proposed project). In order to address the terms of reference, the report is divided into two sections, one each dealing with socio-economic and tourism aspects (albeit that there is some commonality and overlap between the two subjects).

1.2 Qualifications and experience of the practitioners

ACER (Africa) Environmental Management Consultants was established in 1991 and operates throughout Southern Africa. This investigation was conducted by Mr Duncan Keal who has theoretical and practical experience in the assessment of social and socio-economic processes and issues involved in large, often complex projects. The investigation was carried out under the guidance and directorship of Dr Dieter Heinsohn. Dr Heinsohn has developed an impeccable reputation in environmental management. Of particular note is his experience in social impact assessments, the design and running of public involvement programmes, resettlement planning and implementation, and the management of large and/or complex environmental impact assessment processes.

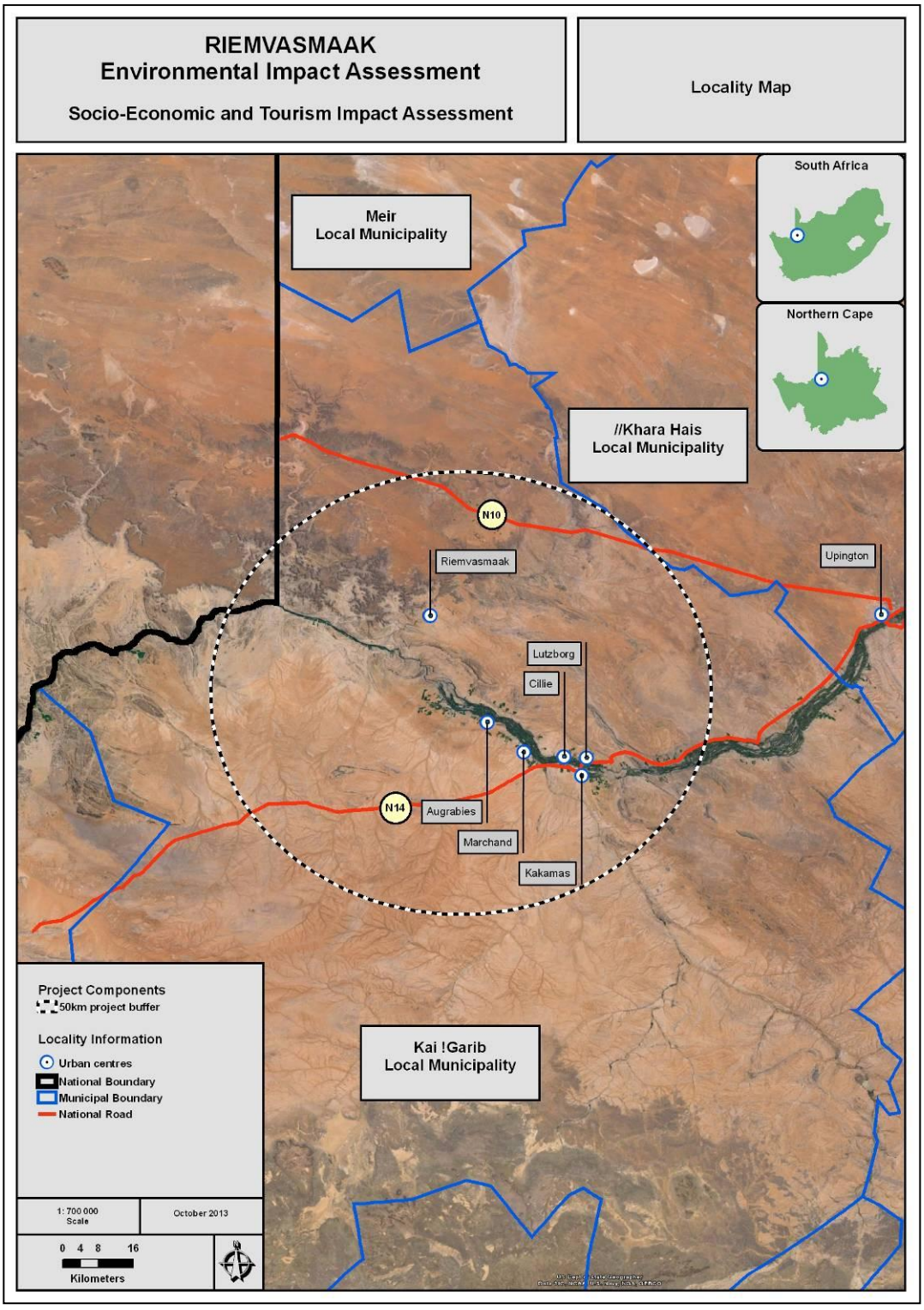

Figure 1 Location of the proposed Riemvasmaak hydropower project

He is a contributing author to UNEP's Dams and Development Project: *Relevant Practices for Improved Decision-Making. A Compendium of Relevant Practices for Improved Decision-Making on Dams and their Alternatives,* responsible for Social Impact Assessment, a contributing author to *A Training Manual on Selected Economic and Social Aspects of Large Water Infrastructure, for the Sustainable Major Water Infrastructure Development Programme in Eastern and Southern Africa. SADC, EAC, UNEP, InWEnt*; and principle author of *Network for Sustainable Hydropower Development in the Mekong Countries (NSHD-M). Training Manual (Generic): Dealing with Social Aspects. GIZ, MRC. [Principle Author].* Relevant qualifications and experience are provided in Table 1.

Table 1 Qualifications and experience

EAP	Academic Qualification	Relevant Work Experience
Dr Dieter Heinsohn	PhD	Dieter Heinsohn has more than 25 years experience in environmental management and social and socio-economic impact assessments. He is registered with the South African Council for Natural Scientific Professions in the field of environmental science (Registration No 400442/04) and certified with the Interim Certification Board. He has worked across a wide variety of sectors and has contributed to various international publications.
Mr Duncan Keal	MA	Duncan Keal is a graduate of Rhodes University and has recently completed an Advanced Certificate in Social Impact Assessment through the University of Johannesburg. He has four years experience in consulting, with a focus on social and socio-economic assessments.

1.3 Purpose and scope of this specialist study report

This report aims to provide the outcomes of the assessment of the socio-economic sensitivities and impacts likely to arise as a result of the proposed development. In addition, the report provides the outcomes of the assessment of the impacts that the project is likely to have on the tourism sector in the area. The following scope of work was provided:

- Undertake a baseline socio-economic analysis to provide an understanding of the current socio-economic environment.
- Describe and evaluate the potential socio-economic impacts, including cumulative impacts, of construction, operation, and maintenance of the proposed development on the socio-economic environment, in terms of the scale, magnitude and the duration of impact.
- Recommend mitigation measures to ameliorate negative and to enhance positive impacts.
- Provide comment on the impact on tourism, using the existing Tourism Study (compiled for the proposed project) as a basis.

1.4 Report structure

This specialist study report consists of 14 chapters. The report is structured as follows:

- Chapter 1 – Introduction.
  - Brief background to the project, details of practitioners and scope of work.
- Chapter 2 – Legal aspects.
  - Relevant legislation including international and national safeguards are discussed.
- Chapter 3 – Project description.
  - The project and all associated components are presented.
- Chapter 4 – Methodology.
  - The manner in which the research and assessment were conducted in discussed.
- Chapter 5 – Assumptions and limitations, and gaps in knowledge.
  - All assumptions made and limitations experienced in compiling this specialist study report are identified.
- Chapter 6 – Study area.
  - The area surrounding where the project will be taking place is described.
- Chapter 7 – Description of the receiving environment.
  - The socio-economic conditions prevailing in the study are discussed.
- Chapter 8 – Description of findings.
  - Possible socio-economic impacts are identified and discussed.
- Chapter 9 – Tourism.
  - The tourism sector within the study area is discussed, impacts identified, assessed and mitigation or management measures identified.
- Chapter 10 – Impact Assessment and mitigation.
  - All identified impacts both positive and negative and assessed according to the required methodology.
  - Mitigation and management measures are identified.
- Chapter 11 – Benefit sharing.
  - Possible benefit sharing options are identified.
- Chapter 14 – Conclusions and recommendations.
  - Final comments on the socio-economic and tourism impacts are provided.

2. LEGAL ASPECTS

2.1 Applicable legislation

The following legislation and associated regulations are relevant to this socio-economic and tourism impact assessment:

- Constitution of the Republic of South Africa Act, 1996 (Act No. 108 of 1996) as amended.
- National Environmental Management Act, 1998 (NEMA) (Act No. 107 of 1998) as amended.
- National Heritage Resources Act, 1999 (Act No. 25 of 1999).

2.1.1 Constitution of the Republic of South Africa Act, 1996 (Act No. 108 of 1996) as amended

The Constitution is the supreme law of South Africa, against which all other laws are measured. It sets out of a number of fundamental environmental rights, important ones of which are described hereunder.

The Environmental Clause
Section 24 of the Constitution outlines the basic framework for all environmental policy and legislation: It states:

"Everyone has the right –

a) to an environment that is not harmful to their health or well-being; and
b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that –
  i) prevent pollution and ecological degradation;
  ii) promote conservation; and
  iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development".

Access to Information
Section 32 of the Constitution provides that everyone has the right of access to any information held by the State or another juristic person, and that is required for the exercise or protection of any rights.

Fair Administrative Action
Section 33 of the Constitution provides the right to lawful, reasonable and procedurally fair administrative action.

Enforcement of Rights and Administrative Review
Section 38 of the Constitution guarantees the right to approach a court of law and to seek legal relief in the case where any of the rights that are entrenched in the Bill of Rights are infringed or threatened.

2.1.2 National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended

The National Environmental Management Act (NEMA) promotes citizens' right to an environment that is not harmful to their health and well being. This right is closely linked to the Constitution where clause 32 of the Bill of Rights stipulates that current and future generations have a right to a healthy environment. NEMA defines the environment as the natural environment as well as the physical, chemical, aesthetic and cultural properties that influences a person's health and well-being.

NEMA provides the legislative framework for Integrated Environmental Management in South Africa. Section 24 provides that all activities that may significantly affect the environment and require authorisation by law, must be assessed prior to approval. Section 2 of NEMA provides a set of principles that apply to the actions of all organs of state that may significantly affect the environment. These principles include the following:

- The sustainability principle.
- The life-cycle, cradle-to-grave principle.
- The 'polluter pays' principle.
- The precautionary principle.
- The duty of care principle.
- Fair and transparent public consultation.

2.1.3 National Heritage Resources Act, 1999 (Act No. 25 of 1999)

The National Heritage Resources Act aims to promote an integrated system for the identification, assessment, and management of the heritage resources of South Africa.

2.2 International safeguards

There are a host of international safeguards that apply to a project of this nature. The accepted best practice safeguards for sustainable development are provided by the World Bank Group[1].

Lending institutions often apply the safeguards described hereunder:

2.2.1 The IFC's Policy and Performance Standards on Social and Environmental Sustainability

- Performance Standard 1: Social and Environmental Assessment and Management Systems.
- Performance Standard 2: Labour and Working Conditions.
- Performance Standard 3: Pollution Prevention and Abatement.
- Performance Standard 4: Community Health, Safety and Security.
- Performance Standard 5: Land Acquisition and Involuntary Resettlement.
- Performance Standard 6: Biodiversity Conservation and Sustainable Natural Resource Management.
- Performance Standard 7: Indigenous Peoples.
- Performance Standard 8: Cultural Heritage.

1 Experience suggests that most international lenders apply the provisions of the World Bank Group.

Of particular relevance to this socio-economic and tourism impact assessment is IFC Performance Standard 1. This establishes the importance of: (i) integrated assessment to identify the social and environmental impacts, risks, and opportunities of projects; (ii) effective community engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them; and (iii) the client's management of social and environmental performance throughout the life of the project. The main objectives of PS1 are:

- To identify and assess social and environment impacts, both adverse and beneficial, in the project's area of influence.
- To avoid, or where avoidance is not possible, minimize, mitigate, or compensate for adverse impacts on workers, affected communities, and the environment.
- To ensure that affected communities are appropriately engaged on issues that could potentially affect them.
- To promote improved social and environment performance of companies through the effective use of management systems.

2.2.2 Equator Principles

Financial institutions have adopted these principles in order to ensure that the projects they finance are developed in a manner that is socially responsible and reflect sound environmental management practices. By doing so, negative impacts on project-affected ecosystems and communities should be avoided where possible, and if these impacts are unavoidable, they should be reduced, mitigated and/or compensated, thereby promoting responsible environmental stewardship and socially responsible development. The following Equator Principles are relevant to this socio-economic and tourism study:

- Principle 1 – Review and Categorisation. The risk of the project is categorized in accordance with internal guidelines based upon the environmental and social screening criteria of the IFC. Projects are classified, relating to social or environmental impacts, in Category A (significant impacts), Category B (limited impacts) and Category C (minimal or no impacts).
- Principle 2 – Social and Environmental Assessment. For all medium or high risk projects (Category A and B projects), sponsors complete an Environmental Assessment, the preparation of which must meet certain requirements and satisfactorily address key environmental and social issues.
- Principle 3 – Applicable Social and Environmental Standards. The Environmental Assessment report addresses:
  - Baseline environmental and social conditions.
  - Requirements under host country laws and regulations.
  - Applicable international treaties and agreements.
  - Sustainable development and use of renewable natural resources.
  - Protection of human health, cultural properties, and biodiversity, including endangered species and sensitive ecosystems.
  - Use of dangerous substances.
  - Major hazards.
  - Occupational health and safety.
  - Fire prevention and life safety.
  - Socio-economic impacts.
  - Land acquisition and land use.
  - Involuntary resettlement, impacts on indigenous peoples and communities.
  - Cumulative impacts of existing projects, the proposed project, and anticipated future projects.

- Participation of affected parties in the design, review and implementation of the project.
- Consideration of feasible environmentally and socially preferable alternatives.
- Efficient production, delivery and use of energy.
- Pollution prevention and waste minimization, pollution controls (liquid effluents and air emissions) and solid and chemical waste management.

- Principle 4 – Action plan and management system. Based on the findings and recommendations of the EIA, an environmental management plan (EMP) is prepared detailing how to monitor, manage and mitigate environmental and social risks arising from the project.
- Principle 5 – Consultation and disclosure. Interested and affected parties (I&APs) need to be consulted a structured and culturally appropriate manner throughout the project, and be informed of all risks, mitigation measures, and benefits of the proposed project.
- Principle 6 – Grievance mechanisms. Grievance mechanisms need to be established as part of the management system.
- Principle 7 – Independent review. For all Category A projects and, as appropriate, for Category B projects, an independent social or environmental expert not directly associated with the borrower will review the Assessment, the Equator Principles Action Plan and consultation process documentation in order to assess Equator Principle Financial Institutions (EPFI) due diligence, and assess Equator Principles compliance.
- Principle 8 – Covenants. Covenants need to be established to ensure compliance with environmental laws, provide periodic reports as agreed with EPFIs, and to decommission the project in accordance with an agreed plan.
- Principle 9 - Independent Monitoring and Reporting. To ensure ongoing monitoring and reporting over the life of the loan, EPFIs will, for all Category A projects, and as appropriate, for Category B projects, require appointment of an independent environmental and/or social expert, or require that the borrower retain qualified and experienced external experts to verify its monitoring information which would be shared with EPFIs.
- Principle 10 – EPFI Reporting. Each EPFI adopting the Equator Principles commits to report publicly at least annually about its Equator Principles implementation processes and experience, taking into account appropriate confidentiality considerations.

2.2.3 Hydropower Sustainability Assessment Protocol

The Hydropower Sustainability Assessment Protocol (developed by the International Hydropower Association) is a sustainability assessment framework for hydropower development and operation. The principles incorporated into the protocol are:

- Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
- Sustainable development embodies reducing poverty, respecting human rights, changing unsustainable patterns of production and consumption, long-term economic viability, protecting and managing the natural resource base, and responsible environmental management.
- Sustainable development calls for considering synergies and trade-offs amongst economic, social and environmental values. This balance should be achieved and ensured in a transparent and accountable manner, taking advantage of expanding knowledge, multiple perspectives, and innovation.
- Social responsibility, transparency, and accountability are core sustainability principles.

- Hydropower, developed and managed sustainably, can provide national, regional, and local benefits, and has the potential to play an important role in enabling communities to meet sustainable development objectives.

2.3 National Safeguards

2.3.1 Independent Power Producer (IPP) Procurement Programme (Vol. 5 Economic Development Requirements)

The South Africa Department of Energy (DoE) has developed an Independent Power Producer (IPP) Procurement Programme Economic Development Policy dated 15 March 2011 ("Economic Development Policy"). The Economic Development objectives that DoE intends to pursue are those set out in the Economic Development Policy.

Bidders are required to provide information to DoE in relation to Economic Development in order to allow for the meaningful evaluation of the Economic Development Proposals submitted.

There are seven categories of information:

- Job Creation.
- Local Content.
- Ownership.
- Management.
- Preferential Procurement.
- Enterprise Development.
- Socio-Economic Development.

These are not fleshed out further in this study and report as they are the subject of a separate elaboration and reporting exercise.

3. PROJECT DESCRIPTION

3.1 Project background

It is proposed that the hydropower facility be a run-of-river hydropower scheme capable of producing a maximum of 40 MW of electricity. The proposed design, a run-of-river scheme, would involve extracting a portion (a maximum of 38m^3/s) of the Orange River's flow approximately 1.5 km upstream of the Augrabies Falls, channelling this flow to a hydropower station and through turbines, using the natural flow and drop in elevation of the river to produce electricity, before returning the water into a tributary of the Orange River approximately 7.5 km downstream of the falls.

It should be noted that during the initial Basic Assessment process and Screening phase, a number of alternatives were assessed. At the completion of these processes, it was decided that the most feasible alternative only should be assessed during the EIA. In this context, this study assessed only the preferred alternative previously identified.

3.2 Project components

The proposed project will involve the construction and operation of a number of components (Figure 2) (a detailed description of the project components, construction process, operation and decommissioning of the proposed hydropower scheme is provided in the Draft Environmental Impact Assessment Report).

- A low diversion weir across the Orange River upstream of the Augrabies Falls.
- An off-take structure at the weir to facilitate diversion of water from the river.
- A conduit – the headrace - to convey water from the intake structure to the penstock head pond.
- A head pond and power station intake structure - forebay.
- Vertical (or very steep) penstocks – pipes - to transfer the water from the head pond to the power chamber.
- An underground power chamber containing up to four Francis turbines.
- An underground tailrace and outlet works to convey water from the power chamber back to the river channel.
- A haulage way and / or haul roads to facilitate access for construction and the removal of excavated material off site for disposal or re-use.
- A high voltage (HV) power line to evacuate the power from the power station to the national grid.
- A transformer yard and mini substation located at the headpond and a new substation.
- Fencing as required for public safety.

In addition, a previously existing pedestrian bridge across the river channel a short distance upstream of the Augrabies Falls, which was washed away by a recent flood event, might be rebuilt as part of the hydropower project.

3.3 Construction

The construction of the proposed hydropower station will take approximately 36 months. During the construction period several major tasks would need to be completed including the construction of the components identified in section 3.2 as well as the removal of spoil from the site and the construction of the necessary infrastructure to remove the spoil.

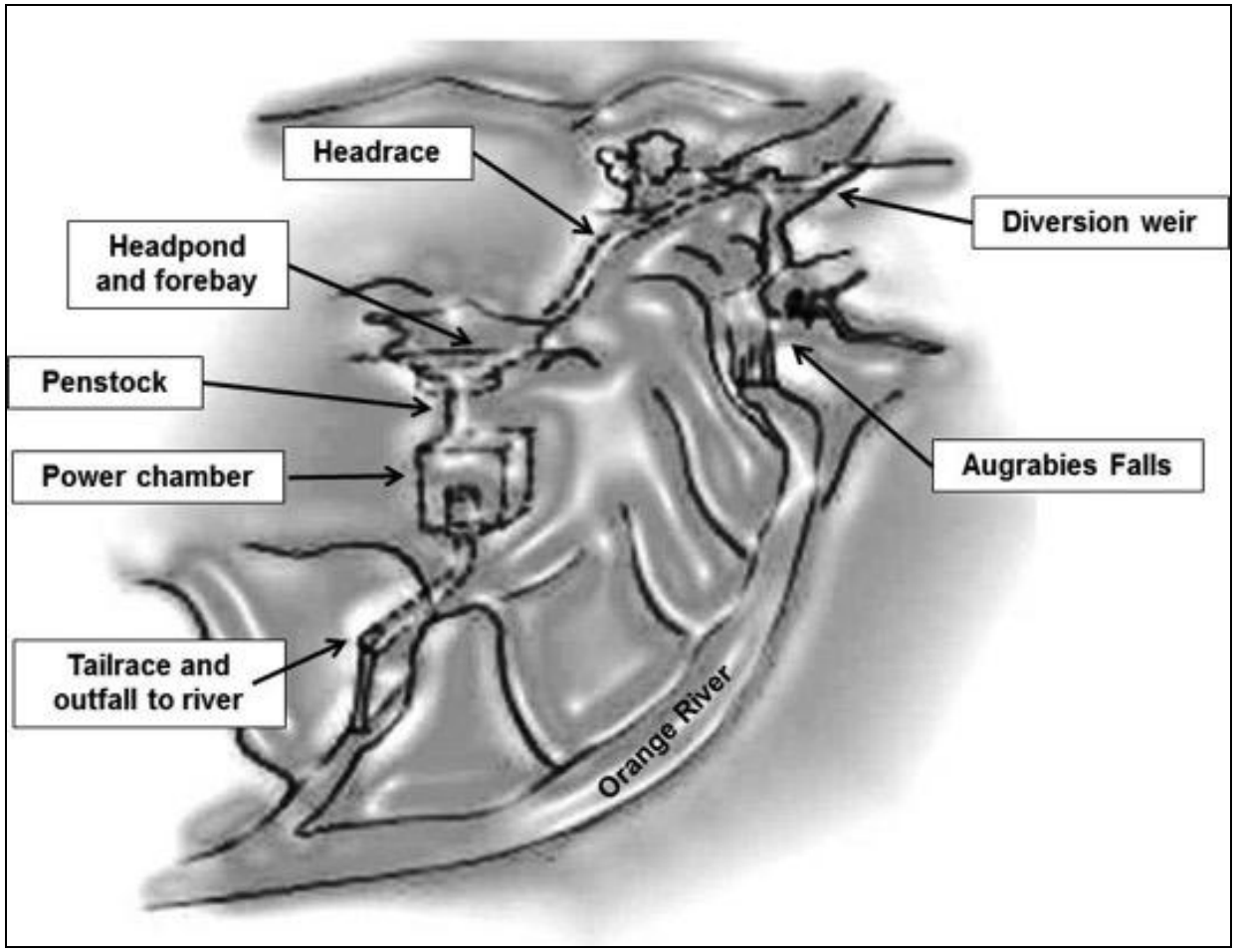

Figure 2 Pictoral representation of the Riemvasmaak Hydroelectric power project (Source: EOH Coastal and Environmental Services)

3.4 Operation of the proposed hydropower station

During the operational phase of the project, staff will be on site on a routine basis to undertake maintenance tasks although operation of the facility will be done remotely. Vehicles will use the permanent access roads to travel to the powerhouse for work. On occasion, maintenance activities will be required on other areas of the project, which may require heavier construction equipment.

3.5 Decommissioning of the proposed hydropower station

The proposed hydropower station will have a lifespan of between 50 - 100 years, although the contract with Eskom would only be for 20 years, at which time it is anticipated that there will be an option to renew the contract. Should the facility be decommissioned, which is unlikely, all components will have to be disassembled, removed and recycled as far as possible. The rehabilitation of the disturbed areas will form part of any decommissioning phase.

4. METHODOLOGY

Both qualitative and quantitative data analysis techniques were applied (using primary and secondary data sources) in order to successfully undertake the socio-economic and tourism impact assessment.

Secondary data sources were used primarily to conduct the baseline socio-economic study of the area. Sources of qualitative data included:

- Municipal Integrated Development Plans.
- The existing socio-economic and tourism impact assessment conducted for the initial Basic Assessment process.
- Draft scoping report.
- Comments and responses report.

Secondary sources of quantitative data used in compiling the baseline socio-economic conditions of the study area included:

- 2011 National Census Data – Statistics South Africa.
- 2007 Community Survey Data – Statistics South Africa.
- 2001 National Census Data – Statistics South Africa.

Primary data were gathered during field work for the duration of one week. During this time, data were generated as follows:

- Site visit to the study area to obtain an informed understanding of the receiving environment.
- Formal and informal discussions with various stakeholders, including:
  - Kai !Garib Local Municipality LED and Tourism Officer.
  - Representatives from the AFNP.
  - Representatives from the Riemvasmaak Tourism Association.
  - Prominent figures within the Riemvasmaak community, as identified by local government officials, including past members of the RCT.
  - Prominent figures within the Augrabies community, including headmasters of local schools.
  - Ward 1 Councillor, the ward within which the project is located.
  - Tourism consultants.
- Formal discussions via email with the RCT Chairperson and Vice-Chairperson.
- Administering structured questionnaires with tourists visiting Augrabies Falls National Park.

The use of both secondary and primary data as well as quantitative and qualitative data allowed for the triangulation of findings.

The impact assessment has been undertaken using conventions and criteria provided by Aurecon:

- Scale of impact (local, regional or national).
- Magnitude of impact (low, medium or high).
- Duration of impact (construction (approximately 3 years), medium term (up to10 years after construction) or long term (more than 10 years after construction)).

5. ASSUMPTIONS AND LIMITATIONS AND GAPS IN KNOWLEDGE

5.1 Assumptions

- The information and data provided by Hydro SA are correct and accurate.
- The information provided by Augrabies Falls National Park is accurate.
- The information provided by the Department of Water Affairs is accurate.
- The social impact identified and assessed will not vary depending on the alternative alignments unless otherwise stated.
- The information provided herein will be adequate for effective decision-making in the EIA.

5.2 Limitations and gaps in knowledge

- When the site visit was conducted, land owners affected by the transmission lines had not been consulted because the servitude rights were still under negotiation. As such, the affected landowners were not communicated with during this time. However, the affected land owners have since been consulted and it is understood that no concerns have been raised at this stage.
- When the site visit was conducted, the 'Spoil Transport Alternatives' and the 'Spoil Disposal Alternatives' had not been confirmed. In this regard, these assessments have been conducted using Google Earth imagery and knowledge of the study area gained during the site visit.

6. STUDY AREA

6.1 Local communities

6.1.1 Riemvasmaak

Riemvasmaak lies approximately 15 km north-east of the Augrabies Falls National Park. The Riemvasmaak community was forcibly removed from their land in 1973 and 1974 under unjust Apartheid policies and the land was used by the South African Military, among other things, as a missile testing range. The forced removal of the community was particularly brutal. Approximately 1,500 people were divided into three groups. Those who were classified under Apartheid laws as Xhosa were moved to Welcomewood in the Ciskei in 1973. Those who were classified of Nama or Damara heritage were forcibly relocated 1,300 kilometres away to Khorixas in northern Namibia in 1973 and 1974. Lastly, those who were classified as coloured remained in areas surrounding Riemvasmaak, such as Marchand, Augrabies and Kiemoes.

Riemvasmaak has a special place in South African history as it was the first land restitution case after the election of a democratic government. In 1994, previous Riemvasmaakers returned to the land from where they had been forcibly removed 21 years earlier.

During discussions with members of the local community, the ward councilor and local government officials, issues such as high unemployment, poor levels of education and few employment opportunities were identified as the major challenges facing the community.

6.1.2 Augrabies

Augrabies is a small town in the Northern Cape province of South Africa, situated on the banks of the Orange River about 100 km downstream from Upington and immediately outside the Augrabies Falls National Park.

The town is surrounded by vineyards and home predominantly to workers in the Orange River wine sector, with the Orange River wine cellars said to be the second largest co-operative wine cellar in the world.

During discussions with various community members from Augrabies, local government officials and ward councillors, a number of challenges facing the community were identified, including high levels of unemployment and poverty, high level of illiteracy and few opportunities.

6.2 Augrabies Falls National Park

AFNP is located about 120 km west of Upington. It covers an area of 820 km² and stretches along the Orange River. The waterfall is approximately 56 m high and is awe-inspiring when the river is in flood.

AFNP is the largest conservation area (51,430 ha) within the Orange River Broken Veld vegetation type. Nearly 70 different species of grass, shrubs, herbs and trees can be found in the AFNP, with the most characteristic plant in the park being the giant aloe (quiver tree (kokerboom); *Aloe dichotoma (*http://www.sanparks.co.za)).

The study area itself is located on the northern side of the Orange River, the access to which is controlled by the AFNP and is currently not open to the public. The area is generally in a pristine condition, although old homesteads, tourist accommodation (currently not open to the public) and dirt roads/tracks are found in the area.

7. DESCRIPTION OF THE RECEIVING ENVIRONMENT

7.1 Overview of the project area

This section provides insight into the socio-economic conditions currently prevailing in the project area. This enables the proposed project to be placed in context, enabling the identification of potential issues and associated impacts that the project is likely to have on the socio-economic environment as well as the impacts which the socio-economic environment are likely to have on the project.

The study site is located on the farm Riemvasmaak (Remainder of Farm No. 497 and Portion 1 of Farm No. 498) (hereinafter referred to as Riemvasmaak), approximately 40 km North West of the town of Kakamas in the Northern Cape Province of South Africa. Riemvasmaak falls entirely within the Kai !Garib Local Municipality (LM) which forms part of the ZF Mgcawu District Municipality (DM) (until July 2013 previously known as Siyanda DM) within the Northern Cape Province.

7.2 Population

In terms of area, the Northern Cape is the largest province in South Africa (372,889 square kilometers) accounting for 30.5% of the entire country. Despite accounting for almost a third of the land in South Africa, the Northern Cape has the smallest population of all the provinces, with a total population of 1,145,861 people and is, thus, the least densely populated region, with an average population density of 3.1 people per square kilometer (StatsSA, 2011).

The ZF Mgcawu DM covers an area of 102,524 square kilometers with a population of 236,783 (2.3 people per square kilometres), while the Kai !Garib covers an area of 26,358 square kilometres with a population of 65,869 (2.5 people per square kilometre) (StatsSA, 2011). These figures show that the Kai !Garib municipality is marginally more densely populated than the district but is noticeably less densely populated than the province as a whole. This is likely the result of few urban settlements within the district municipal area.

Other population indicators show similar trends throughout the Northern Cape, ZF Mgcawu DM and Kai !Garib LM. There is, however, a noticeable difference in annual average household incomes, with households in the Kai !Garib LM earning below the provincial and district averages. It should be noted that households in the Northern Cape, ZF Mgcawu DM and the Kai !Garib LM all fall well below the South African average annual household income of R 119,542 (StatsSA, 2011). Table 2 presents the figures discussed above.

Table 2 Population indicators (StatsSA, 2011)

2011	Northern Cape	ZF Mgcawu DM	Kai !Garib LM
Total Population	1,145,861	236,783	65,869
Population Density (people per km²)	3.1	2.3	2.5
Average Population Growth Rate	2.1%	2.1%	2.1%
Total Households	301,367	61,086	16,700
Average Household Size	3.8	3.9	3.9
Female Headed Households	33.8%	35.7%	34.6%
Formal Dwellings	82.4%	79.4%	88.4%
Average Household Income Per Annum	R 86,158.00	R 92,878.00	R 71,739.00

7.3 Education

The percentage of the population over the age of 20 within the Kai !Garib LM reported to never have received any formal education decreased from 14.7% in 2001 to 9% in 2011 thus showing a general improvement in access to education. The percentage of the population within Kai !Garib over the age of 20 with a Grade 12 level of education has also seen improvements between 2001 (11.2%) and 2011 (15.5%); however, these figures are significantly lower than the provincial average (22.7%) and the district average (21.7%). This trend continues with access to tertiary education in the Kai !Garib, again, below the provincial and district averages. Table 3 provides details on access to education.

Table 3 Education indicators (Stats SA, 2011)

	No School (%)		Grade 12 (%)		Tertiary Education (%)	
	2001	**2011**	**2001**	**2011**	**2001**	**2011**
Kai !Garib	14.7	9	11.2	15.5	3.7	3.9
ZF Mgcawu District	16.5	9.6	15.8	21.7	4.7	6.3
Northern Cape	19.3	11.3	15.8	22.7	5.9	7.5
South Africa	17.9	8.6	20.4	28.9	8.5	11.8

Within Kai !Garib LM, there are 20 pre-primary schools/crèches, 26 primary schools and five secondary/high schools. Of these, three pre-primary schools/crèches, five primary schools and no secondary/high schools are located in the Augrabies and Riemvasmaak areas. These figures are consistent with findings from discussions with the Kai !Garib LED and Tourism Officer, a headmaster from the town of Augrabies and the Ward Councilor who all noted the lack of access to high schools and tertiary education, especially in the towns of Augrabies and Riemvasmaak, as a major challenge facing education and, in turn, to socio-economic development.

7.4 Economic sectors

The majority of economic activity within the Kai !Garib LM take place around the Orange River, with the most towns and settlements found adjacent to the river (Kai !Garib IDP, 2013-2014). The agricultural sector is the main driver of the local economy, contributing 51.8% of the municipal GDP and also accounting for 66.5% of all formal employment (Kai !Garib IDP, 2013-2014). The agricultural sector is heavily dependent on the cultivation of grapes for export and for the production of wine and raisins. There has also been a noticeable growth in citrus production in the area (Kai !Garib IDP, 2013 – 2014).

There are a number of emerging farmers in the municipality who focus predominantly on small stock farming, lucern, cotton, corn and nut production (with crop production being under irrigation with water sourced from the Orange River). These farmers are constrained by poor quality access roads and a lack of available funding (Kai !Garib IDP, 2013 – 2014).

Other major contributors to the municipal GDP include community and government services (15.9%) and the wholesale and retail sectors (11.3%) (Kai !Garib IDP, 2013 – 2014). It should be noted that the possibility of the area contributing to the generation of sustainable energy, in particular, solar energy, has been identified as a sector with significant scope for growth and possible spinoff benefits for the local community (Kai !Garib IDP, 2013 – 2014). Figure 3 below illustrates the contributions made by each of the economic sectors.

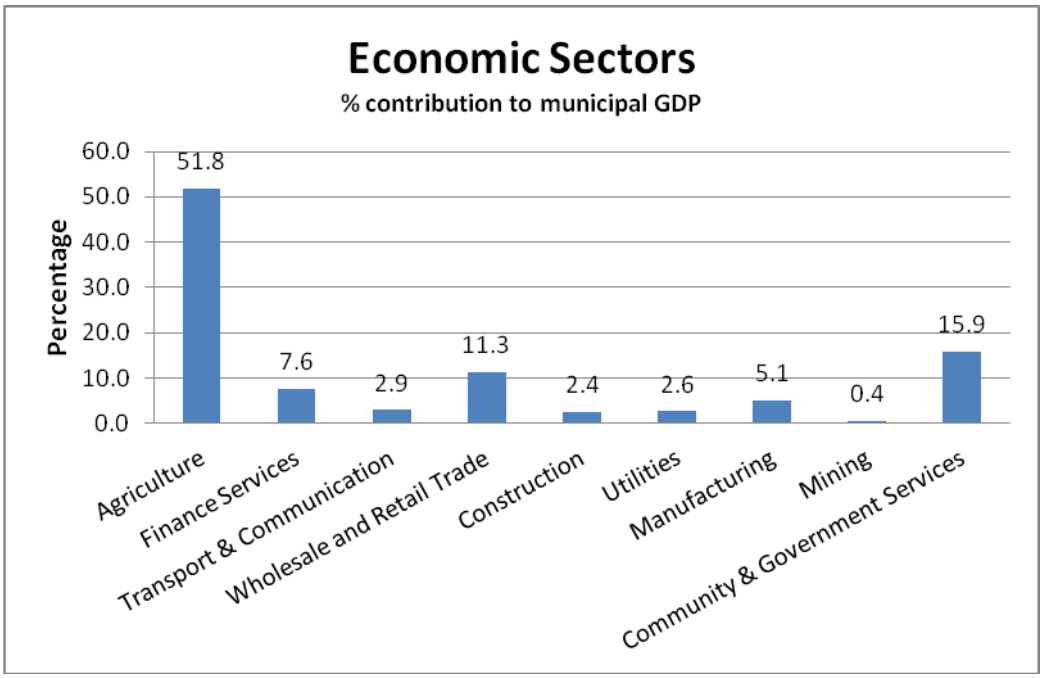

Figure 3 Percentage contribution to the Kai !Garib municipal GDP per economic sector (Kai !Garib IDP, 2013-2014)

7.5 Employment

Unemployment in the Kai !Garib LM is reported to have improved significantly between 2001 and 2011, dropping from 16.1% in 2001 to 10% in 2011 (StatsSA, 2011). In addition, these figures are below both the provincial (28.1%) and district (21%) average for 2011 (StatsSA, 2011). It should, however, be noted that these figures are for the official unemployment rate and may be somewhat misleading as they exclude those sectors of the population who fall within the economically active sector of the population but are not economically active.

This view is supported by findings during field work where a number of respondents identified high unemployment as a major factor limiting development in the area. In addition, the Kai !Garib LM IDP (2013-2014) notes that the majority of residents are reliant on government pensions and grants, and live in poor conditions. High levels of unemployment among the youth were a further issue identified in the municipal IDP as a significant factor contributing to social ills in the area. Table 4 provides a comparison in employment levels between the provincial, district and local spheres for both the working age population and the youth.

Table 4 Official unemployment rates (StatsSA, 2001 & 2011)

	Unemployment (Official)		Youth Unemployment (Official)	
	2001	**2011**	**2001**	**2011**
Kai !Garib LM	16.1%	10%	17.7%	10%
ZF Mgcawu DM	26.5%	19.2%	32.1%	22.7%
Northern Cape	35.6%	27.4%	44.1%	34.5%

7.6 Access to basic services

7.6.1 Access to piped water

Access to piped water within the Kai !Garib LM is worse than within both the district municipality and province. In the Kai !Garib LM, 7% of households reported no access to piped water, while 4% and 3% reported no access in the ZF Mgcawu DM and the Northern Province, respectively (StatsSA, 2011). It is of interest, however, that a higher proportion of the population within the Kai !Garib LM reported having access to piped water within their dwelling or yard than the provincial average. What is of concern is that there has been very little improvement in access to piped water between 2001 and 2011 within the Kai !Garib LM, with the percentage of the population without access dropping from 9% to 7%. Table 5 provides details of changes in the level of access within the local and district municipalities and the province between 2001 and 2011.

Table 5 Access to piped water (StatsSA, 2001 & 2011)

	Piped water inside dwelling/yard		Piped water at communal stand		No access to piped water	
	2001	2011	2001	2011	2001	2011
Kai !Garib LM	81.5%	82.9%	9.8%	10.3%	8.7%	6.8%
ZF Mgcawu DM	79.4%	86.2%	15.5%	9.5%	5.1%	4.3%
Northern Cape	71.9%	78.1%	22.0%	19.3%	6.1%	2.6%

7.6.2 Access to sanitation

Access to sanitation within the Kai !Garib LM is worse than the overall levels experienced by households within the ZF Mgcawu DM and the Northern Cape Province. In 2011, 12% of households within Kai !Garib LM reported no access to sanitation, 10.4% in the ZF Mgcawu DM and 8.2% in the Northern Cape Province. It should be noted that since 2001 there have been improvements in access to sanitation within Kai !Garib LM, with the percentage of households reporting no access decreasing from 16.3% to 12% and thee percentage of households reported to be using the bucket system dropping from 5.7% to 0.5% (StatsSA, 2001). Overall access to sanitation is detailed in Table 6.

Table 6 Access to sanitation (StatsSA, 2001 & 2011)

	Access to flush or chemical toilets		Pit Latrines		Bucket System		None	
	2001	2011	2001	2011	2001	2011	2001	2011
Kai !Garib LM	63.1%	72.7%	14.9%	14.8%	5.7%	0.5%	16.3%	12.0%
ZF Mgcawu DM	69.4%	73.3%	10.7%	10.7%	6.7%	5.6%	13.2%	10.4%
Northern Cape	58.5%	67.6%	18.4%	20.2%	10.0%	4.0%	13.1%	8.2%

7.6.3 Access to electricity

Households within Kai !Garib LM are reported to experience marginally better access to electricity than is generally experienced in the ZF Mgcawu DM and Northern Cape Province. 88.2% of households within Kai !Garib LM reported having access to electricity for lighting in comparison to 87.5% in the ZF Mgcawu DM and 86.7% for the Northern Cape Province. It should however be noted that a significant improvement in access to electricity for lighting has been experienced throughout the province, district and local municipality since 2001. Details of improvements in access to electricity for lighting are detailed in Table 7.

Table 7 Access to electricity for lighting (StatsSA, 2001 & 2011)

	Access to Electricity for lighting	
	2001	2011
Kai !Garib LM	70.2%	88.2%
ZF Mgcawu DM	71.7%	87.5%
Northern Cape	72.4%	86.7%

7.7 Access to healthcare

There are reported to be 95 clinics in the Northern Cape, with access to these facilities not comparing favorably to South Africa as a whole. There are 20 medical facilities in the Kai !Garib LM, including seven satellite clinics, four permanent clinics, six mobile clinics, two community healthcare clinics and one hospital (Kai !Garib IDP, 2013-2014). In relation to the study site, there is a satellite clinic in Augrabies and a permanent clinic in Riemvasmaak. The need for Government healthcare in the area is evident in that only 14.7% of the population have access to medical insurance.

The key health challenges in the Kai !Garib LM are (Kai !Garib IDP, 2013-2014):

- HIV and AIDS increase and TB increase.
- High rate of teenage pregnancies.
- Lack of sufficient and qualified staff – limited skills amongst current nurses and nursing sisters to make the correct diagnosis and prescribe the correct medicine. Lack of sufficient facilities to render a proper health service to all communities in Kai !Garib.
- Irregular and insufficient services rendered by mobile clinics.
- Lack of necessary health equipment and medication at clinics.

HIV and AIDS related deaths have been identified as the single biggest cause of death in the Northern Cape. This, in turn, has contributed to an estimated 10,000 AIDS orphans in the province. This said, a survey in 2011 found that HIV prevalence in the Northern Cape amongst the general population is estimated to be 17%, which is the lowest of all the provinces in South Africa. In addition, there has been a reported decrease in HIV prevalence among antenatal woman (South African National Aids Council, 2013).

7.8 Summary

From the aforementioned, it is evident that there are numerous social and economic challenges being faced within the broader project area, especially relating to access to education, in particular, secondary and tertiary education and skills development. In accordance with the IPP Procurement Programme, briefly discussed in Section 2.3.1, there are various socio-economic development requirements among other development imperatives to which the project proponent needs to abide. The serious lack of development in the area presents numerous opportunities for such development (Section 11).

8. DESCRIPTION OF FINDINGS

8.1 Social change processes

"Social change processes are set in motion by project activities or policies. Depending on the characteristics of the local social setting and mitigation processes that are put in place, social change processes can lead to social impacts" (Vanclay, 2003).

This section of the report aims to provide insight into social change processes that are likely to occur as a result of the proposed hydro electric power plant in Riemvasmaak. The social change processes identified in the following sections are based on an indicative list of processes described by Van Schooten *et al*., (2003); however, only the social processes relevant to this study have been included. It should be noted that the social change processes discussed below are not socio-economic impacts themselves but, as a result of the social change processes taking place, social impacts may occur. The socio-economic impacts which are likely to occur as a result of social change processes are detailed in Section 8.2.

Social change processes have been identified as occurring in three different categories:

- Social change processes originating during planning and pre-construction.
- Social change processes expected to set in during construction.
- Social change processes expected during operations.

The phase at which a social change process is likely to occur is assessed in a table at the end of each section.

8.1.1 Demographic processes

Demographic processes relate to the movement and composition of people in the region affected by the proposed project.

8.1.1.1 In-migration

According to the World Bank, the induced population increase associated with a development initiative is estimated to equal the number of people employed on the project (World Bank, 2001). This movement of people can be attributed to people searching for both direct and indirect economic opportunities associated with the proposed development as well as employees brought into the area to conduct the work. However, the geographical location, social and socio-economic conditions of surrounding areas as well as the type of development taking place should all be taken into consideration when anticipating the possible immigration of people.

Considering the relatively remote nature of the project site, it is not thought that there will be a significant in-migration of people to the project area and the surrounding settlements as a direct result of the project. However, the possibility of job seekers moving from the surrounding rural areas, which are characterised by high levels of unemployment and poverty, should not be discounted. It is likely that the settlements around the project site, including Kakamas, Augrabies and Marchand, are most likely to be affected by possible in-migration.
In addition, it is likely that there will be the temporary movement of skilled labourers into the project area and surrounding settlements while there may also be the movement of people

between settlements such as Riemvasmaak, Augrabies, and Marchand into Kakamas where it is proposed that the construction workers be accommodated. The social impacts which are likely to occur as a result of in-migration are discussed in section 9.2.

Table 8 Project phase at which demographic processes are relevant

Process	Phase at which demographic processes are relevant		
	Prior to construction	Construction	Operation
In-migration	x	✓	x

8.1.2 Economic processes

Economic processes are those processes that affect the economic activity in a given area. This includes the way people make a living, employment rates as well as macro-economic factors which affect society as a whole (Van Schooten *et al*., 2003).

8.1.2.1 Waged labour

Direct employment opportunities will be created for people within the vicinity of a new project, with between 150 – 200 temporary jobs likely to be created in this instance. In addition, 5 – 10 permanent jobs will be created, of which only one will not be held by a member of the local community following the completion of the necessary training. It is understood that in terms of the Independent Power Producers process, communities within a 50 km radius of the project are required to benefit and, as such, the majority of jobs will be created for persons coming from surrounding communities. An increase in the proportion of the population earning a consistent wage is likely to impact positively on the local economy as there is more disposable income, albeit of a temporary nature limited to the construction period which would be approximately three years in duration. The nature of the employment created by a project, i.e., skilled or unskilled, permanent or temporary, and the number of employment opportunities are factors that will determine the significance of the changes to the existing economic processes within the study area. In addition, there is also the possibility of in-direct economic opportunities for SMEs and local contractors, which, in turn, will result in increased waged labour.

8.1.2.2 Conversion and diversification of economic activities

The conversion and diversification of economic activities refers to the change in the nature of economic activities within an area as a result of a project (Van Schooten *et al*., 2003). The promise of better paying jobs related to the proposed development may lead to some of the local labour force leaving their current occupations in order to take up employment opportunities offered by the proposed development. This is most likely to be felt in the agricultural sector. As the majority of the jobs created by the proposed development will be temporary in nature, on completion of the project, these individuals may find themselves unemployed. In addition, there may be other changes in social processes, such as more seasonal workers being present in the area in order to address the employment needs in the agricultural sector. This, in turn, could have knock-on social impacts of a similar nature to those arising from the proposed project itself. It should be noted that in the event of natural disasters, such as drought, flood, excessive frost, etc. or market related declines affecting the agricultural sector, the conversion and diversification of economic activities may be

exacerbated with a greater number of people seeking employment with the proposed new development. However, the potential positive impacts should not be ignored as, in the event of employment opportunities being lost in the agricultural sector, the proposed new development could absorb a portion of the unemployment (albeit marginal numbers during operation).

Table 9 Phases at which economic process are relevant

Process	Phase at which economic processes are relevant		
	Prior to construction	Construction	Operation
Waged labour	x	✓	✓
Conversion and diversification of economic activities	x	✓	x

8.1.3 Emancipatory and empowerment processes

Emancipatory and empowerment processes are those that lead to an increase in the ability of local people to affect (contribute to) decision making that affects their lives (Van Schooten *et al*., 2003).

8.1.3.1 Capacity building

Capacity building refers to increasing knowledge, networking capacity and increasing the skills base amongst local people (Van Schooten *et al*., 2003). The proposed project has the potential to lead to skills development amongst people living in the local communities surrounding the project area.

Table 10 Phases at which emancipator and empowerment processes are relevant

Process	Phase at which emancipator and empowerment processes are relevant		
	Prior to construction	Construction	Operation
Capacity building	x	✓	✓

8.1.4 Socio-cultural processes

Socio-cultural processes are those that affect the culture of a society, including all aspects of the way that people live together (Van Schooten *et al*., 2003).

8.1.4.1 Deviant social behaviour

The movement of construction workers and job seekers into the project area and surrounding communities, coupled with an increase in expendable income, may lead to an increase in deviant social behaviour. Possible deviant social behaviour includes prostitution, excessive alcohol consumption, illegal drug use and other types of risk taking behaviour, all of which may result in social impacts.

Table 11 Phases at which socio-cultural processes are relevant

Process	Phase at which socio-cultural processes are relevant		
	Prior to construction	Construction	Operation
Deviant social behaviour	X	✓	X

8.2 Social Impacts – preconstruction and construction phase

The purpose of this section is to identify anticipated social impacts which may occur as a result of the social change processes identified in Section 8.1 during the preconstruction and construction phase of the project. Social impacts can be positive or negative and occur within the context of human behaviour, which is often unpredictable, varies according to cultures, traditions, political and religious beliefs, and are influenced by perceptions.

It should be noted that all of the socio-economic impacts identified and discussed below apply to the project in its entirety and are inclusive of all infrastructure and possible alternatives unless otherwise specifically stated.

8.2.1 Health and social wellbeing

8.2.1.1 Increased spread of disease

Any development which causes the migration of people has the potential to lead to the spread of disease; in particular, HIV and AIDS in the case of South Africa. Research suggests that the presence of migrant construction workers leads to an increase in activities such as prostitution, with promiscuity often associated with groupings of construction workers. This could lead to scenarios where infected construction workers coming into the area spread the disease through unprotected intercourse with sex trade workers or local individuals, who, in turn, spread it locally. Alternatively, an uninfected construction worker could become infected through unprotected intercourse and, on return to his/her place of origin spread the disease there.

An increase in the spread of diseases and, in particular, HIV and AIDS, is also likely to be caused by the movement of trucks carrying construction materials moving in and out of the project site. Research suggests that the areas with the highest prevalence of HIV and AIDS are situated adjacent to the major transport routes due largely to transmission between sex workers and truckers (www.sanral.org). While it has not been confirmed where the required construction materials will be sourced, it is likely that there will be a significant increase in truck traffic through towns such as Augrabies, Marchand and Kakamas as well as other towns en route to the project site.

In terms of sourcing construction workers, it is understood that the majority of labour will be sourced from the surrounding communities in order to meet the terms of the Independent Power Producers process. In light of this, the number of workers entering the project area from outside will be reduced which should limit the possible impact of a spread in disease. Nevertheless, it is anticipated that there will be a number of job seekers entering the area, probably in a transient manner, who may contribute to an increased likelihood of an increased spread of disease. While the impact is not thought to be significant, it should be taken into consideration and the necessary mitigation measures followed.

Numerous cumulative impacts exist as a result of the spread of disease. In the case of HIV and AIDS, the long-term impacts include a reduced and inefficient work force leading to lower household income security and greater poverty. The number of child- and elderly-headed households may increase, making access to education problematic as other responsibilities take priority. There is also likely to be an increased financial burden on the State as dependency increases. In the case of other diseases, the effect is more immediate. Project deadlines may be delayed due to unhealthy workers while the spread of water borne diseases in local communities could lead to possible pandemics. These impacts are, however, not thought to be significant for the proposed project.

8.2.1.2 Reduced road safety

In order to access the project site, construction vehicles will be required to travel approximately 50 km on a gravel/sand road between the N14 and the project site, with the road deteriorating significantly the closer one gets to the project site (Plates 1 and 2). A section of the road is currently used by people travelling to and from the Riemvasmaak Community as well as by farmers and farm workers living and working in the area. The road has not been designed to take high volumes of traffic or for use by heavy duty vehicles required for the transportation of large pieces of equipment such as pipes, generators, etc. associated with the project. In addition, the road is often used by slow moving farm machinery such as tractors as well as by pedestrians. The increased volume of traffic on the road, particularly by heavy duty vehicles, the resultant deterioration in road conditions due to over use and increased dust will all contribute to reduced road safety.

8.2.1.3 Potential for accidents on site

During the construction of the proposed project, there is the potential for serious accidents occurring. It is important to note the generally poor access to healthcare facilities within the municipality and district. Considering the remote nature of the project site and the limited access to healthcare facilities, it is important that emergency healthcare facilities are available on site and that there is a suitable evacuation plan in the event of serious and/or life threatening injuries.

Plate 1 Access road between the N14 and the project site

Plate 2 Access road viewed from within the project site

8.2.2 Quality of the living environment

8.2.2.1 Increased pressure on existing infrastructure and services

It is understood that construction workers are to be housed in formal accommodation either in Kakamas town or between Kakamaas and the project site. It is understood that existing formal accommodation will be used to house construction workers within Kakamas as opposed to a temporary construction camp. However, regardless of the proposed accommodation, there is the possibility that the temporary influx of between 150 – 200 construction workers into the town of Kakamas, or the surrounding area, which will place increased pressure on the existing service infrastructure, including water and electricity supply, and sanitation systems. Possible interruptions in the availability of such services could result in community dissatisfaction, general unrest and feelings of anger towards the project and associated workers.

Road infrastructure is also likely to be negatively impacted as a result of the project. While there will be a general increase in traffic through the area, it is likely to be the presence of large construction vehicles and large heavy duty trucks used for the transportation of the equipment associated with the project that will cause the most damage. Damages to road infrastructure are likely to lead to reduced road safety (Section 8.2.1.2), increased costs for local government in terms of road maintenance and a general feeling of dissatisfaction among local residents towards the project. However, it is recommended that, if feasible, excess spoil excavated as part of the proposed project be donated to the provincial roads authority or the district and local municipalities to use for the upgrading of roads in the area. This material can, therefore, be used to upgrade and/or maintain the gravel roads that might be negatively affected by the proposed project.

8.2.2.2 Increased dust

During construction, it is likely that there will be a significant amount of dust generated through various activities, which, in turn, will have a negative impact on the surrounding environment.

Construction activities are likely to leave areas of soil/sand stockpiles exposed as well as other exposed areas where vegetation has been removed. In addition, trenching activities for the laying of underground pipelines and transmission lines, and blasting will be required, which will also contribute to the level of dust in the atmosphere. While there are no settlements in the immediate vicinity, during periods of strong wind, windblown dust is not visually appealing and it may affect the accommodation facilities within the AFNP as well as towards the agricultural areas close to the project site. While it is reported that it is difficult to estimate the distance of impact that windblown dust may have (Liebenberg-Enslin, 2013) (which is affected by particle size, wind speed, wind duration, soil moisture, temperature, land surface characteristics and the like), negative effects from dust over larger than anticipated distances should not be underestimated.

Of greater concern regarding dust generation is the increased vehicle traffic along the access road. As noted in Section 8.2.1.2, it is anticipated that there will be a significant increase in the volume of traffic on the access road linking the N14 with the study site. The current road is a gravel/sand road (Plates 1 and 2) which is not heavily utilised. The presence of more vehicles, in particular large heavy duty vehicles transporting equipment, will increase dust levels significantly. This dust, while reducing road safety (Section 8.2.1.2) will act as a nuisance factor for local inhabitants, potentially having an effect on peoples' health.

Dust also negatively affects vineyards and grapes (a dominant agricultural crop in the area). This is because the dust gathers on the vines and blocks the stomata (small pores found in the epidermis of leaves, stems and other organs, which are important in the control of gas exchange in which air (CO_2 and O_2) enters the plant and is used in photosynthesis. The stomata are also important for the release of O_2 (from photosynthesis) and water vapour (from transpiration). Consequently, the blocking of the stomata, therefore, inhibits plant growth. Dust is also problematic for table grapes as the harvested fruit must be washed (this is less problematic for wine grapes where, during the wine making process, floculents are added to the vats to clarify the wine (settling dust within the process). It is common for producers of table grapes to tar roads within their vineyards, alternatively, to mix oil within the road surface of gravel roads to reduce impacts from dust (Mr van den Berg, personal communication). In this context, accumulated dust within vineyards could have negative financial consequences for the affected farmers. This is an issue which needs to be discussed further with farmers adjacent to the access road to better understand what the potential impacts may be on their agricultural activities.

Special attention needs to be paid to the proposed Spoil transport and Spoil disposal method.The construction of an access road to the tailrace tunnel for the removal of spoil is likely to increase dust levels significantly due to the large number of trucks required to move the spoil as well as the dust generated while constructing the access road. The other spoil transport alternatives are not thought to have a significant impact in terms of dust. In terms of the disposal of spoil, the stockpiling of spoil on a piece of land is also likely to have an impact on the levels of dust during times of strong winds as there will be significant amounts of exposed spoil. This may be of particular concern to the neighbouring commercial farmers as there are cultivated lands within 1 km of the proposed spoil stockpiling site. It is understood that this material may be crushed onsite in order to be used for the upgrading/maintenance/construction of access roads. This activity will also lead to increased dust in the vicinity of the spoil stockpile. Again, possible nuisance impacts for local residents and possible impacts on the vineyards need to be taken into consideration. In this regard local farmers should be consulted to establish potential impacts.

8.2.2.3 Increased criminal activity

Prior to and during construction, the in-migration of job seekers is likely to bring with them criminal opportunists. Although the relatively remote nature of the project site will somewhat limit the likelihood of criminal activities in the direct vicinity of the project site, it should be noted that one of the issues which came out of discussions with Riemvasmaak community members is the need to ensure that there is no poaching of game in and around the AFNP. The proposal to house the construction workers within Kakamas town will greatly reduce the possibility of such activities occurring.

While criminal activity may be less likely to occur around the project site itself due to its remote nature and the fact that construction workers will not be housed on site (thereby reducing the presence of job seekers and potential criminal opportunists), the housing of construction workers within Kakamas may result in an increase in criminal activity within the town. This is likely to be fuelled by deviant social behaviour, such as drug and alcohol abuse. It should be noted that the construction workers themselves are not seen as likely criminal opportunists but rather unemployed job seekers moving through the area.

8.2.2.4 Increased fire hazard

Increased human activities during construction add to the risk of accidental veld fires. Construction activities are often associated with fire risks. These risks could result from exposed fires for cooking and warmth, cigarettes, burning of firebreaks, and the use of flammable liquids. The dry and hot conditions associated with the project site make the area particularly vulnerable to fire. Uncontrolled fires may lead to the loss of wild game as well as undesirable visual impacts for tourists in the AFNP. In addition, the destruction of natural vegetation as a result of fire, at the wrong time of year, could lead to increased dust, soil erosion and a loss of grazing and browsing material for animals.

8.2.3 Cultural impacts

8.2.3.1 Cultural heritage

As noted in Section 7, the project site is one of significant historical and cultural value to the Riemvasmaak community. While greater detail is provided in the Heritage Impact Assessment Report, there are a number of historical artefacts within the project site, in particular, graves (Plate 3) and ruins of buildings. As confirmed in the Heritage Impact Assessment Report, and during discussions with members of the Riemvasmaak community, there is little concern regarding the proposed development as long as there is no damage to the existing graves, historical artefacts and other areas of cultural significance to the Riemvasmaak community. All of the alternative designs under investigation would be aligned to avoid impacting on the cultural heritage sites. During construction, these areas should be clearly demarcated as “no go” areas in order to ensure that there is no damage to the sites.

While the Heritage Impact Assessment has identified existing sites of cultural heritage, there is always the possibility of ‘chance finds’ during the construction process which may include unmarked graves, middens, etc. In the event of such sites being unearthed, construction activities will need to be temporarily halted in the immediate area until such time as the site has been assessed, the community consulted and direction provided by SAHRA.

Plate 3 Grave within the project site

8.2.4 Sense of place

8.2.4.1 Increased noise

During construction, there are likely to be numerous activities which will increase the level of noise associated with the project site, which, in turn, is likely to have a significant impact on the existing sense of place. Such activities will include the movement of construction vehicles, the movement of heavy duty trucks used for the transportation of project equipment, construction machinery, such as crusher plants and jackhammers, and most significantly, blasting (albeit blasting is of a short duration for each event). The propsoed spoil transport method is also likely to impact on noise levels. Activities associated with the construction of access roads required for the removal of spoil as well the presence of heavy duty vehicles using the access road are likely to increase the 'unnatural' noise in the area. It should be added that the proposed access road is also significantly closer to areas of the AFNP accessible to tourists. Considering that the area is characterised by virtually no 'unnatural' noise and that a major attraction for tourists coming to the AFNP is the 'peace and tranquillity' associated with the park, an increase in noise is likely to have an impact on the sense of place of the area and, thus, the nature of the experience had by tourists.

During discussions with representatives from the AFNP as well as a tourism consultant, the following concerns were raised:

- The impact of noise associated with construction, particularly blasting, on tourists coming to the AFNP.
- The impact of noise associated with construction, particularly blasting, on animals in the area.

Cumulative impacts as a result of increased noise, the resultant altered sense of place and the experience had by tourists to the AFNP may include a reduction in tourism for the park throughout construction leading to a loss in revenue for the duration of construction, estimated at 36 months.

It is understood that a Noise Impact Assessment has been conducted for the proposed project and that, due to the distance from noise sensitive receptors (noise levels are expected to be limited to 500 m of the construction activities) it was deemed of little significance.

8.2.4.2 Aesthetic impacts

Impacts on the aesthetic nature of the area could be significant in terms of the sense of place associated with the AFNP. It is understood that from the Augrabies Falls boardwalk and lookout point, the various components of the project will not be visible because of sensitive design features and most of the infrastructure will be buried and/or constructed underground (thereby reducing any potential visual impacts). During discussions with representatives from AFNP, it came to the fore that there are various view points, in particular, Moon Rock, in the park from where construction activities are likely to be visible (these have also been mentioned in the Visual Impact Assessment Report) albeit at a distance.

During construction of 36 months there will be various construction vehicles on site, including large trucks and earth moving equipment as well as construction materials and people. Such features will detract from the natural beauty associated with the adjacent AFNP. In addition, the construction activities are likely to generate a significant amount of dust, which will also impact on the aesthetics of the area.

It is understood that motion sensor lights will be used within the construction camp at night for security purposes. The presence of these lights is likely to have a negative impact on the aesthetics of the area as, at present, there is very little artificial lighting in the project area.

Measures should be put in place to ensure that the visibility of construction equipment and materials are reduced as far as possible. This is especially the case when closing camp at the end of the day or during periods of no work, in particular, during peak tourism periods.

Specific project components and alternatives which are likely to have an impact on the aesthetic nature of the area and, thus, sense of place are outlined below:

- New 33 kV to 132 kV sub-station – considering the presence of other construction activities, the construction of the sub-station is not thought to be of major concern. Regarding the visual impact for people living in close proximity to the project site, the proposed location is approximately 3 km from the closest residential house. It should be noted, however, that during the operation phase of the project, the visual impact posed by the current location of the sub-station is thought to be more significant (Section 8.3.3.2)
- 132 kV lines and associated infrastructure – during the construction process, there will be changes in the aesthetic nature of the area as areas typically categorised by natural environment or vineyards will now temporarily resemble a construction site. This impact will occur for a period of approximately 12 -24 months, importantly, within the total 36 month construction period for the entire project.
- The access road to tailrace tunnel (for the transportation of spoil) – it needs to be established whether the proposed route for the access road will be visible from the AFNP. If this is the case, the construction of a new access road will have an impact on the aesthetics of the area. In addition, it is anticipated that a large number of trucks will be required to move the spoil material, which will also impact the aesthetics of the area. It should be noted that for the purposes of this assessment it has been assumed that the access road will be visible. This assumption has been based on images from Google Earth and some knowledge of the study area.

- Stockpiling of spoil on a piece of land - the area identified for the stockpiling of spoil is adjacent to the proposed site for the new 33kV to 132kV sub-station. During construction the presence of the spoil stockpile may present a visual impact. However, it needs to be considered that the impact will be temporary in nature, is approximately 3 km from the closest residential house and can easily be mitigated through shaping the spoil site in such a manner as to have the smallest possible impact.

8.2.5 Economic impacts and material wellbeing

8.2.5.1 Increased employment opportunities

It has been estimated that between 150 – 200 temporary jobs will be directly created during construction for an estimated period of three years. At this stage it is unclear as to what percentage of these jobs will be skilled and what percentage unskilled. As noted in Section 7 the project area is characterised by high levels of unemployment, and, as such, the possibility of 150 – 200 jobs is seen to be of significant benefit to the local community (albeit for the short-term).

During discussions and communication with Riemvasmaak community members, the ward councillor, local government officials and RCT Trustees the expectation of employment was identified as the major benefit the project would have for the local community. It was noted that the community of Riemvasmaak is plagued by high levels of unemployment and that employment in the area is generally temporary in nature. While the RCT has requested that the majority of labour be sourced from Riemvasmaak, it is important to note that in terms of the Independent Power Producer process, all communities within 50 km of the project need to benefit.

This was highlighted by local government officials, the ward councillor and members of the Augrabies community who all noted that other communities in the area, namely Augrabies and Marchand which face similar problems to Riemvasmaak, also need to benefit from the project. In addition, it was noted that a number of Riemvasmaak beneficiaries now reside in the communities of Augrabies and Marchand and should not be overlooked when potential construction staff are identified.

Cumulative impacts as a result of increased employment for the local community are numerous. Increased employment will result in an increase in expendable income within the local community. This, in turn, will have benefits for local business owners. Other benefits will include an overall increase in the standard of living for a section of the population, available funding for schooling, tertiary education and other training. The potential negative benefits should not be ignored. Research suggests that an increase in disposable income in poor communities often results in increased alcohol abuse, which results in other social problems associated with deviant social behaviour.

Concerns were raised among community members regarding communications between the project proponent, contractors and the local community regarding employment opportunities and any problems which may arise in this regard during construction. It was suggested that a community liaison officer from the various communities be appointed in order to mediate between the employer and the employees. The appointment of a community liaison officer was identified as of vital importance and as way in which potential problems can be addressed before they lead to construction being temporarily halted and deadlines delayed. These details will be fleshed out at a later stage when the project proponent is assured that the project is viable and all licenses are in place (not least to avoid creating unnecessary expectations which may not be fulfilled over time).

8.2.5.2 Financial benefits for RCT

As a result of the proposed development, the RCT and, therefore, the Riemvasmaak Community will benefit financially in two ways, viz. through rental income and dividends as a shareholder in the company. However, during construction, only the annual rental income will apply with the dividend income only commencing six months after the project starts operating.

The socio-economic implications of such benefits are significant. As noted by Mr Matthews, acting chairperson of the RCT, and Mr Theunissen, trustee of the RCT, and by general members of the Riemvasmaak community, the belief is that such a system will not only benefit the community in the present but should continue to benefit the community in a sustainable manner for the lifetime of the project.

Communication with the acting chairperson on the RCT suggested that, at present, details as to how the potential income will be used are unavailable; however, it was confirmed that it will be used for community upliftment. A consistent income for the RCT has the potential to benefit the community at large with cumulative benefits, such as better access to services, education, etc likely to benefit the community in the long-term. However, it needs to be appreciated that the RCT has received significant amounts of funding since being established, yet the community at large is faced with numerous socio-economic problems and a general lack of access to services, including education.

In addition, it was confirmed by Mr Matthews (acting chairperson of the RCT) and Mr Theunissen (trustee) (personal communication) that irregularities have been experienced in the past, resulting in their appointment by the Master of the Northern Cape High Court. In order to avoid any irregularities in the spending of finances received and to ensure that the community at large benefits from the proposed project, checks and balances should be put in place.

8.2.5.3 Increased opportunities for SMEs

The proposed project will create opportunities for SMEs located in the vicinity of the proposed project. Through discussions held with local government officials, the ward councillor and community representatives, it emerged that, in the past, project developers have not made use of local contractors and/or SMEs which is leading to a level of resentment within the local communities. The need for opportunities for local companies to be created during the proposed project was stressed by these respondents. Services which could be provided by local SMEs may include: road maintenance, removal of spoil material, provision of accommodation, provision of meals, etc.

Cumulative impacts which may occur in the event of local SMEs being appointed to assist on the proposed development will include employment opportunities which will result in an increased expendable income and more money within the local economy, improved standards of living, improved access to education, etc.

8.2.5.4 Increased opportunities for informal traders

Due to the remote nature of the project site as well as that access will be controlled, it is unlikely that informal traders will be present at the construction site. However, opportunities will exist for informal traders in a vicinity of where the construction team is accommodated, at this stage it is proposed to be in the town of Kakamas. There are both positive and negative cumulative impacts. Informal trading will provide a temporary source of income for local households and indirectly increase money in the local economy, albeit by a small amount. Conversely, the presence of informal traders may have detrimental effects on the local environment. There is likely to be an increase in littering, the uncontrolled dumping of refuse and the use of surrounding areas as informal latrines.

8.2.5.5 Temporary and permanent loss of land

As a result of the proposed project there will be no permanent loss of land. While the project area may be temporarily classified as a “no-go” area, this should not be an issue as access to the project site is controlled by the park and is not open to the public. However, there will be a permanent loss of land associated with the sub-station to be constructed on private land adjacent to the project site. The maximum footprint of the sub-station will be 50 x 50 m. The proposed site is not currently being used for any economic activity (Plate 4) and, therefore, there should be no significant financial loss as a result of the loss of land. The affected landowner should be consulted and compensated at market value.

Plate 4 Proposed site for the construction of the sub-station

8.2.5.6 Temporary disruption to farming activities

Overhead 132 kV transmission lines will be required to evacuate power from either the proposed sub-station or, alternatively, directly from the hydro power station (the transmission lines will be under ground until they leave the current 497/0 property fence line wherafter they will be overhead to the Renosterkop Sub-station). The approximate length of the transmission lines will be 16 km. From aerial imagery and observations during field work it is evident that the majority of the proposed alignment is through land not currently under cultivation and without existing transmission line infrastructure. There is, however, a section of approximately 1.3 km where the proposed route will go through land used for grape cultivation. During construction, there will be a temporary disruption to farming activities in this area. However, with mitigation measures, no losses should be incurred.

8.2.5.7 Tourism

As a major tourism area, the potential impact that the proposed development will have on tourism and economic ramifications of such impacts are of importance. These are discussed in detail in Chapter 10.

8.3 Socio-economic impacts – operational phase

The following section identifies the socio-economic impacts the proposed project is likely to have during its operational phase.

8.3.1 Quality of the living environment

8.3.1.1 Increased dust

During the operational phase of the proposed project, the project site will need to be accessed by operators and for maintenance purposes. This will result in an increase in traffic on the gravel/sand access road which will lead to increased levels of dust. It should be noted that the increase in traffic will be minor and largely sporadic and, therefore, it is thought to be insignificant.

8.3.2 Cultural impacts

8.3.2.1 Cultural heritage

During the operational phase of the project, there will be limited movement of people and vehicles within the project area for operating and maintenance purposes. There is the potential that during this time damage may be caused to objects of cultural heritage or historical significance. It should, however, be noted that with the appropriate mitigation measures this should be insignificant.

8.3.3 Sense of place

8.3.3.1 Increased noise

It is understood that the level of noise given off by components of the hydro power station, including the weir, pipeline and turbines, are relatively minor. In addition, the power house will be underground and contained within a building; therefore, the impact of noise is thought to be insignificant.

8.3.3.2 Aesthetic impacts

The majority of the infrastructure at the project site will be buried or constructed underground. The exception to this includes the weir and the head pond. It is understood that both of these components will not be visible from the Augrabies Falls viewing decks or from other vantage points within the park. It should, however, be noted that concern was raised by representatives of AFNP regarding the impact that such infrastructure would have if it were visible. It has been confirmed that lighting on the project infrastructure will be activated by motion sensors. The area is characterised by low levels of unnatural light sources and, therefore, the presence of lighting will cause a visual impact. However, this is not considered significant because the lights will not be on permanently.

The transmission infrastructure, including a sub-station and overhead transmission lines, will impact on the aesthetics of the area.

- 33 kV to 132 kV sub-station – the proposed location of the new sub-station is adjacent to the current 497/0 property fence line. While, at present, the area is off limits to the public, it is noted by members of the RVM tourism association as well as representative of the AFNP that there are plans to extend eco-tourism to this area. In the event of this taking place in the future, the presence of an electrical sub-station adjacent to the existing access gate is likely to impact on the aesthetics of the area and, thus, the sense of place. It must be noted that every effort is being made to ensure that the visual impacts are kept to a minimum, at what is assumed to be significant costs. All these efforts seem futile if a sub-station is to be constructed in the proposed location. As such, it is recommended that the location of the proposed sub-station be moved a few kilometres from the current 497/0 property fence line in an effort to reduce the visual impact, alternatively, the sub-station could be bunded using spoil material to create artificial landscape that blends in with the surrounding environment.
- 132 kV transmission lines – the routes for the proposed 132 kV transmission lines are already characterised by a small amount of electrical infrastructure; however, none as large as 132 kV lines. As such, it is anticipated that there will be an impact on the aesthetic nature of the area, in particular, where the lines run in close proximity to farm houses. While it is understood that the transmission lines will be routed underground, they will emerge once leaving the boundary. As mentioned above with the 33 KV to 132 kV sub-station, it seems futile to route the transmission lines underground only to emerge on the boundary. It is recommended that in order to reduce potential visual impacts, the transmission lines be extended underground for a further few kilometres from the boundary.

8.3.4 Economic impacts and material wellbeing

8.3.4.1 Increased employment opportunities

During the operational phase, between five and ten permanent jobs will ultimately be created once the necessary skills training has taken place. Of the aforementioned, only one job would not be local. The cumulative impacts of permanent employment are numerous, including: an improved level of income, an improved standard of living, and increased ability to access services such as health, education, etc. In addition, there is the likelihood of skills development as an indirect result of the employment opportunities. This will increase the ability of individuals to access other skilled positions of a similar nature.

8.3.4.2 Establishment of a Broad Based Community Trust

In terms of the IPP Procurement Programme, all communities within 50 km of the project are required to benefit from the project (refer to Figure 1 showing the 50 km buffer area around the project). While details are not finalised as to how the Broad Based Community Trust would be structured in terms of the IPP Procurement Programme, the needs of the surrounding communities are to be identified and strategies put in place as to how these will be addressed. It is assumed that the Broad Based Community Trust would essentially be tasked with addressing the socio-economic needs of communities within 50 km of the project site.

This is work that will be undertaken at a later date when there is certainty that the project is viable and fully licensed.

8.3.4.3 Socio-Economic Development (SED) Spend

In terms of the IPP Procurement Programme, all communities within 50 km of the project are required to benefit from the project (refer to Figure 1 showing the 50 km buffer area around the project) through the developer (RVM 1 Hydro Electric Power) spending a percentage of its revenue on socio-economic development. In terms of the IPP Procurement Programme, RVM 1 Hydro Electric Power are targeted to spend 0.6% of their revenue on enterprise development and 1,5% of revenue on socio-economic development. Considering the high levels of poverty and poor socio-economic conditions prevailing in many of the surrounding communities, it is likely that any improvements will have significant benefits for the local communities. At present, it is unclear exatly how this process will be implemented; however, in terms of the IPP Procurement Programme, the needs of the surrounding communities are to be identified and strategies put in place as to how these will be addressed.

8.3.4.4 Financial benefits for the RCT

Throughout the operational phase of the proposed project, the RCT will receive income via two sources. The RCT will receive rental income for the use of their land and will also be made a shareholder in the company and, thus, receive dividends from the project. It is understood that the payment of dividends will commence six months after the project becomes operational. Both of these will provide a consistent income for the RCT throughout the projects lifespan. While it could not be confirmed for what exactly this income will be used, it was confirmed by the RCT trustees that it will be put towards the upliftment of the community. The cumulative impacts of a sustained income of this nature could include an improved standard of living for the entire community, improved access to services such as

healthcare and education, the availability of funding for small business ventures, etc., all of which also have spinoff benefits, which should contribute to the overall development of the community.

8.3.4.5 Improved energy production

Through the proposed project there will be additional power supplied to Eskom who at present are experiencing shortfalls in power. The benefits of the project will include carbon savings from the decreased reliance on non-renewable sources such as coal-fired power stations, as well as contributing towards South Africa's energy requirements.

8.4 Social Impacts – Decommissioning Phase

In the unlikely event of the hydropower station being decommissioned, the associated activities will be accompanied by potential social impacts. Potential positive impacts are considered to be of a similar nature to those during construction, for example, increased employment opportunities, increased opportunities for SMEs, etc. Similarly, negative impacts are also likely to occur, for example, the spread of disease, especially sexually transmitted diseases such as HIV/AIDS. However, it needs to be noted that no meaningful assessment of possible socio-economic impacts can be considered as the socio-economic climate currently prevailing in the study is likely to have changed significantly by the time that decommissioning of the hydropower station is considered (the hydropower station is reported to have a lifespan of between 50 and 100 years). While potential impacts have been assessed in the impact tables, these are based on the existing socio-economic environment and are essentially meaningless. As such, is it recommended that in the event of decommissioning taking place, a fresh socio-economic assessment should be undertaken.

9. TOURISM

9.1 Background

In the following section, the potential impact that the proposed project would have on tourism in the broader study area is assessed. Defining the tourism sector is difficult as it is inclusive of numerous different goods and services, such as the transport, hospitality industry and retail sectors. The World Trade Organisation's definition of tourism states that "...tourism comprises the activities of persons travelling to, and staying in places outside their usual environment, for not more than one consecutive year, for leisure, business and other purposes". In this regard, the impact on tourism needs to be seen in a broader sense as there are likely to be numerous indirect and induced impacts as a result of changes in the local tourism industry.

Tourism is identified in the ZF Mgcawu District IDP and Kai Garib Local Municipal IDP as one of the most important sectors for both the district and provincial economy, with it being noted that tourism was the fastest growing sector in the municipality between 2007 and 2011 (Siyanda IDP, 2013 – 2014). The Kai !Garib LM has identified the tourism sector as one with significant potential for growth which needs to be exploited.

9.2 Existing tourism activities

9.2.1 ZF Mgcawu District Municipality

The ZF Mgcawu DM has various tourism attractions, in particular, national parks and reserves. The Kgalagadi Transfrontier Park, the Spitskop Nature Reserve and the Augrabies Falls National Park are all found within the district. Other opportunities are based around eco-tourism, such as 4x4 trails, camping, etc.

9.2.2 Kai !Garib Local Municipality

Within the Kai !Garib LM there are various established tourism attractions, including the Augrabies Falls National Park and the Kokerboom Food and Wine Route, while there are a number of tourism attractions which need to be unlocked, including the Tierberg Nature Reserve, heritage sites and ancient rock art in Kenhart, water tunnels in Kakamas, Rooibergdam in Kenhart and the historical and cultural sites and eco-tourism of Riemvasmaak (Kai !Garib IDP, 2013-2014).

9.2.3 Augrabies Falls National Park

In terms of the proposed development, the most significant impacts on the tourism industry are likely to be felt by the Augrabies Falls National Park due to the development taking place adjacent to its borders.

The Augrabies Falls is a significant tourist draw card in the region, with 84,627 visitors in 2010, 83,970 visitors in 2011, 58,066 visitor in 2012 and 36,885 visitors between January and August 2013 (AFNP Booking Records). It should, however, be noted that flooding in 2010 and 2011 skewed the figures as people flocked to AFNP to see the falls in flood conditions.

The main attraction within the reserve is the Augrabies Falls itself, a 56 m high waterfall with various viewing decks and the park reception in near vicinity. The river then continues its path through an 18 km gorge. Two hiking trails exist with the longer, 3 day trail being closed during October to May due to the heat. Mountain biking and game driving also takes place within the park. Several panoramic viewpoints can be visited inside the park, all of which give wide open vistas of the park, the gorge and the Orange River. These viewpoints are Moon Rock (offering one of the best views of the park and surrounds), Swart Rante, Oranjekom and Ararat (offering the best opportunity to observe the massive gorge area) and Echo Corner (Urban-Econ, 2012). In addition to these activities *'Kalahari Outventures'* offers white water rafting trips which take place above the falls and canoe trails which take place below the falls[2].

9.3 Impacts on tourism - construction phase

In this section the impact that various components of the proposed project may have on the tourism industry during the construction phase are assessed. It should be noted that during discussions with a tourism consultant from the Northern Cape, it was noted that the Augrabies Falls is a significant tourism destination within the Northern Cape (Mr Page, personal communication). Furthermore, while the falls may not be the primary reason for tourists being in the area, many tourists pass through the area en route to Namaqualand or Namibia or alternatively visit the area for other activities such as those provided by ''*Kalahari Outventures'*, these tourists invariably visit the AFNP. This was confirmed by representatives from the AFNP who noted that a large portion of their visitors are en route to Namaqualand to view flowers. Data showing visitors into the park support this viewpoint with the months of August and September (the time when the Namaqualand flowers are in bloom) continuously in the top five most busy months between 2009 and 2013 (Figure 4).

9.3.1 Sense of place

Changes to the sense of place which may impact negatively on tourism in the area are the same as those detailed in Section 8.2.4, viz. impacts on the aesthetic nature of the area and an increase in noise and dust associated with construction activities. The natural beauty of the area, virtually no 'unnatural' noise and the general 'peace and tranquillity' associated with the AFNP are significant attractions for tourists visiting the park as well as for people rafting, paddling or fishing on/in the river. This was confirmed with findings from the questionnaires conducted with tourists (Section 10.5). A change in the sense of place associated with AFNP is likely to result in reduced tourist activity for the park. There is the possibility that if the visual and noise impacts are not properly mitigated during construction there may be an impact on the sense of place. This in turn will negatively impact the experience of tourists to the park which will reduce the possibility of them returning or reporting favourable on their experience at AFNP. Cumulatively this could impact on the number of tourists visiting the park. That said with sufficient mitigation measures overall experience for tourists visiting should not be significantly affected (certainly not during operation as the power house is underground).

2 http://www.kalahari-adventures.co.za/page/home

9.4 Impacts on tourism – operational phase

9.4.1 Sense of place

As discussed in Section 8.3.3, during the operational phase of the proposed project, there is potential for likely minor impacts on the sense of place relating to visual and noise impacts. Again these may impact on people visiting the AFNP as well as those rafting, paddling or fishing on/in the river. However, with appropriate mitigation measures, these impacts should become negligible and not dissimilar to existing structures and activities on and adjacent to the river.

9.4.2 Reduced flow over the Augrabies Falls

As a result of the proposed development, the water flow over the Augrabies Falls will be regulated. While a minimum of 30m³/s will always be channelled to the falls, provided the flow of the river is not below this level, there will always be a slight reduction in the amount of water reaching the falls when the river is flowing above 30m³/s. The issue of reduced flow and the impact it may have on tourism for the park and tourists' experience of the falls was identified by representatives of the AFNP who noted the importance of the falls in attracting tourist. In an effort to gauge the importance of the volume of water moving over the falls on the number of visitors to the park, visitor data from March 2009 to August 2013 were compared with flow data for the same period.

Data from February 2010 and January 2011 show that during times of heavy flow, the number of visitors to the park increases significantly, suggesting a direct correlation between the level of flow and the number of visitors to AFNP. However, it needs to be noted that at these particular times the Orange River was in flood.

From September 2011 to August 2013, while the flow has remained relatively consistent, there have still been noticeable spikes in visitors to the park around the August and September periods, probably caused by tourists en route to Namaqualand, and December and January, a peak holiday period. The increase in tourists during these times can also be seen in 2009 and 2010. These findings suggest that while there is likely to be a large influx of tourists during times of flood, generally the number of visitors to the park is not solely determined by the volume of water over the falls.

In addition, the amount of water being channelled to the proposed hydroelectric scheme will be proportional to the total volume of water in the river, but will never exceed 38m³/s. It is suggested that the proportion by which the flow over the Augrabies Falls will be reduced at any given flow will not be noticeable to the viewer and, as such, will not reduce the visitor experience. White water rafting activities, conducted by *'Kalahari Outventures',* take place above the falls and, as such, a reduction in flow will not have an impact on these activities. In the case of the canoe trails which take place below the falls, water would have been diverted back into the river above where the canoe trails start and, as such, no impact will be felt.

Plates 5 and 6 show how a slight difference in flow volume is almost impossible to notice and, therefore, it is unlikely to result in a reduced experience for tourists. In addition, it should be noted that as the total volume of water being taken off by the proposed project will never exceed 38 m³/s, the falls will retain their spectacular nature during periods of flooding.

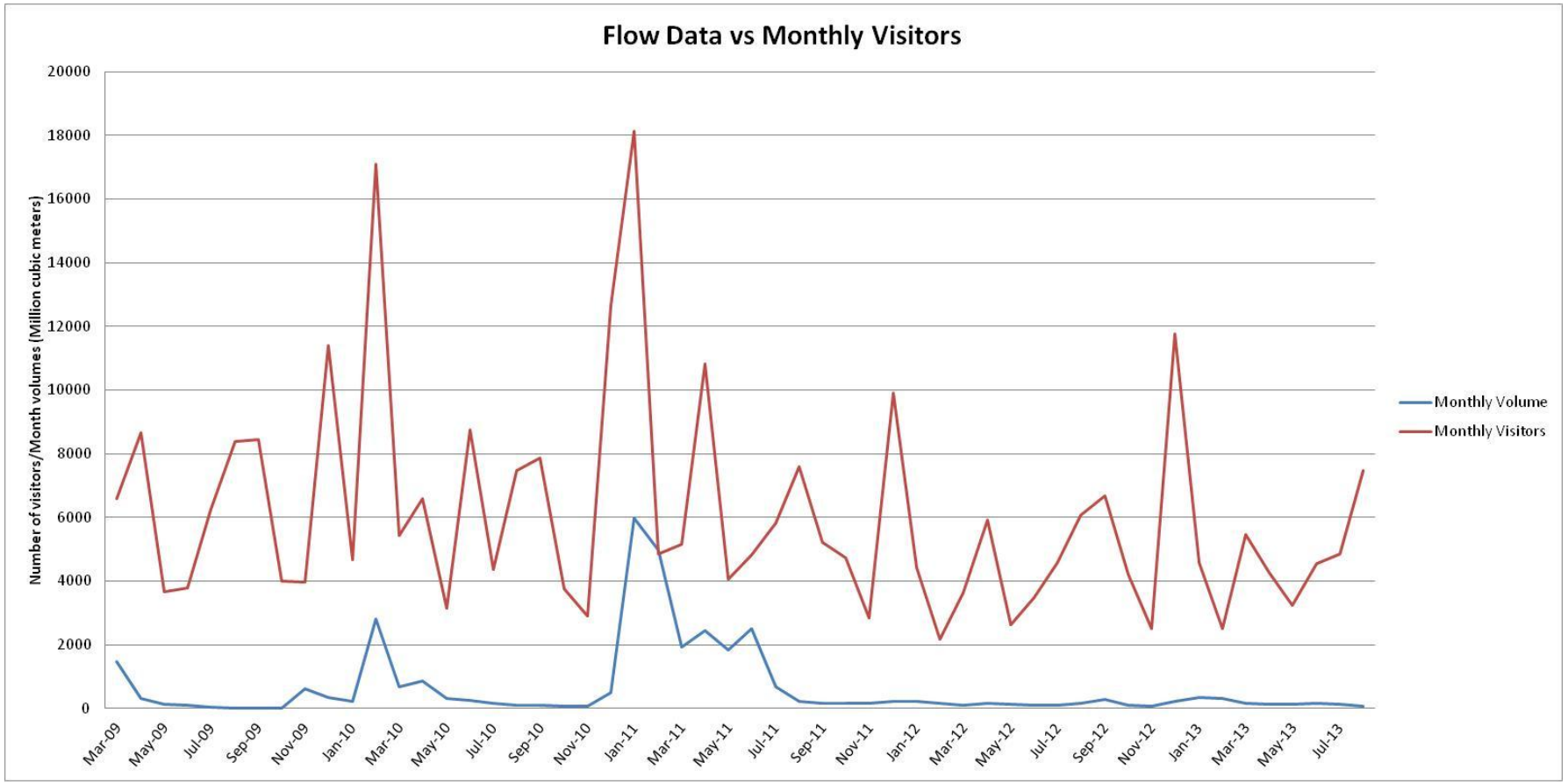

Figure 4 Monthly flow data and monthly visitors to AFNP between March 2009 and August 2013 (DWA and AFNP)

Plate 5 Augrabies Falls at a flow of 34 m³/s

(Source of flow data: http://www.dwaf.gov.za/Hydrology/Daily/Default.aspx (accessed: 11 September 2013))

Plate 6 Augrabies Falls at a flow of 41 m³/s

(Source of flow data: **http://www.dwaf.gov.za/Hydrology/Daily/Default.aspx** (accessed: 11 September 2013))

9.4.3 Increased tourism opportunities

There are many examples of tourism being stimulated through the presence of hydropower plants. Even though issues of tourism are usually taken into consideration during construction, there are many instances of favourable factors emerging indirectly in the course of time. Guided tours of power plants and information centres attract numerous visitors, who also make use of other tourist facilities in the immediate area.

During discussions with a tourism consultant based in the Northern Cape who has extensive knowledge of the project area and tourism within the area, it was noted that there is potential for the proposed hydropower scheme to be used to generate tourism. It was added that such an opportunity needs to be considered early in the design phase, as infrastructure, such as viewing decks, would contribute to the marketability of the scheme as a tourism attraction (Mr Page, personal communication). It has also been established that a Development Committee set up by the Riemvasmaak community is investigating this as a potential tourism option. In the event of the scheme being used as a tourism attraction, various spinoff opportunities arise, such as employment opportunities for tour guides which will assist the local communities. In addition, it was noted by representatives of the Riemvasmaak Tourism Association and representatives of the AFNP that there are plans to extend tourism into the area where the proposed project will be taking place. The plan to extend tourism to this area could benefit from improved access to the area created by the instillation of the hydropower scheme. However, the good access will reduce the potential of the area as a 4x4 tourism route (a possible option suggested by the Riemvasmaak Tourism Association) while the presence of artificial lights, even if only activated by motion sensors, will limit the attractiveness of the area as an ecotourism destination. Lastly, it should be noted that from questionnaires completed by visitors to the AFNP, the majority of respondents reported that they did not consider a tour of a hydropower station as a tourist opportunity and, thus, did not see it as contributing to tourism for the park.

9.5 Questionnaire findings

Questionnaires were left at the reception desk of the AFNP and visitors asked to complete them. Although feedback was limited the some common trends emerged. Interesting findings from the questionnaire include:

- The majority of respondents were local tourists (from South Africa).
- The majority of respondents had visited the AFNP previously.
- Respondents reported visiting the area due to its natural beauty, fauna, flora and the activities available, for example, hiking and mountain biking.
- The majority of visitors were staying for more than two nights.
- Despite it being explained that the impact on the flow over the falls would be negligible, 50% of respondents felt that the hydropower station would detract from the visitors' experience.
- The majority of respondents did not feel the hydropower plant would hold any tourism potential.
- All respondents reported that they intended on returning to the AFNP

10. IMPACT ASSESSMENT AND MITIGATION

10.1 Impact assessment tables

Table 12 Assessment of increased spread of disease

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Construction phase	Layout (preferred)	Increased Spread of Disease (Negative)	Regional	Low	Short Term	Low	Very Low	Definite	Sure	Reversible
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
	Spoil transport option 1 (Access Road to Tailrace)									
	Spoil transport option 2 (Tunnel)									
	Spoil transport option 3 (Conveyor)									
	Spoil transport option 4 (Haulage way/ cableway)									
	Spoil Disposal option A									
	Spoil disposal option B									

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Operational phase	Layout (preferred)	Increased Spread of Disease (Negative)	N/A							
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Decommissioning phase	Layout (preferred)	Increased Spread of Disease (Negative)	Regional	Low	Short Term	Low	Very Low	Definite	Sure	Reversible
	Layout (alternative)									
	Mitigation Alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Cumulative Impact		Increased Spread of Disease (Negative)	Regional	Low	Short Term	Low	Very Low	Definite	Sure	Reversible
No-Go Option		Increased Spread of Disease (Negative)	N/A							

Table 13 Assessment of reduced road safety

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Construction phase	Layout (preferred)	Potential for Accidents on Site (Negative)	Regional	High	Construction Period	Medium	Low	Definite	Certain	N/A
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
	Spoil transport option 1 (Access Road to Tailrace)									
	Spoil transport option 2 (Tunnel)									
	Spoil transport option 3 (Conveyor)									
	Spoil transport option 4 (Haulageway/ cableway)									
	Spoil Disposal option A									
	Spoil disposal option B									

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Operational phase	Layout (preferred)	Potential for Accidents on Site (Negative)	Regional	Very Low	Long Term	Low	Very Low	Definite	Certain	N/A
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Decommissioning phase	Layout (preferred)	Potential for Accidents on Site (Negative)	Regional	High	Construction Period	Medium	Low	Definite	Certain	N/A
	Layout (alternative)									
	Mitigation Alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Cumulative Impact		Potential for Accidents on Site (Negative)	Regional	Medium	Long Term	High	High	Definite	Certain	N/A
No-Go Option		Potential for Accidents on Site (Negative)	N/A							

Table 14 Assessment of reduced road safety

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Construction phase	Layout (preferred)	Reduced Road Safety (Negative)	Regional	High	Construction Period	Medium	Low	Definite	Certain	Reversible
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
	Spoil transport option 1 (Access Road to Tailrace)									
	Spoil transport option 2 (Tunnel)									
	Spoil transport option 3 (Conveyor)									
	Spoil transport option 4 (Haulage way/ cableway)									
	Spoil Disposal option A									
	Spoil disposal option B									

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Operational phase	Layout (preferred)	Reduced Road Safety (Negative)	N/A							
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Decommissioning phase	Layout (preferred)	Reduced Road Safety (Negative)	Regional	High	Construction Period	Medium	Low	Definite	Certain	Reversible
	Layout (alternative)									
	Mitigation Alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Cumulative Impact		Reduced Road Safety (Negative)	Regional	High	Construction Period	Medium	Low	Definite	Certain	Reversible
No-Go Option		Reduced Road Safety (Negative)	N/A							

Table 15 Assessment of increased pressure on existing infrastructure

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Construction phase	Layout (preferred)	Increased Pressure on Existing Infrastructure (Negative)	Regional	Medium	Short term	Medium	Low	Probable	Unsure	Reversible
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
	Spoil transport option 1 (Access Road to Tailrace)									
	Spoil transport option 2 (Tunnel)									
	Spoil transport option 3 (Conveyor)									
	Spoil transport option 4 (Haulage way/ cableway)									
	Spoil Disposal option A									
	Spoil disposal option B									

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Operational phase	Layout (preferred)	Increased Pressure on Existing Infrastructure (Negative)	N/A							
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Decommissioning phase	Layout (preferred)	Increased Pressure on Existing Infrastructure (Negative)	Regional	Medium	Short term	Medium	Low	Probable	Unsure	Reversible
	Layout (alternative)									
	Mitigation Alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Cumulative Impact		Increased Pressure on Existing Infrastructure (Negative)	Regional	Medium	Short term	Medium	Low	Probable	Unsure	Reversible
No-Go Option		Increased Pressure on Existing Infrastructure (Negative)	N/A							

Table 16 Assessment of increased dust

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Construction phase	Layout (preferred)	Increased Dust (Negative)	Local	Low	Construction Period	Low	Very Low	Definite	Certain	Reversible
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
	Spoil transport option 1 (Access Road to Tailrace)		Local	Medium	Construction Period	Medium	Low	Definite	Certain	Reversible
	Spoil transport option 2 (Tunnel)		Local	Medium	Construction Period	Medium	Low	Definite	Certain	Reversible
	Spoil transport option 3 (Conveyor)		Local	Low	Construction Period	Low	Low	Definite	Certain	Reversible
	Spoil transport option 4 (Haulageway/ cableway)		Local	Low	Construction Period	Low	Low	Definite	Certain	Reversible
	Spoil Disposal option A	Increased Dust (Negative)	Local	Medium	Construction Period	Medium	Low	Definite	Certain	Reversible
	Spoil disposal option B	Increased Dust (Negative)	Local	Low	Construction Period	Low	Low	Definite	Certain	Reversible

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Operational phase	Layout (preferred)	Increased Dust (Negative)	Site Specific	Very Low	Long Term	Very Low	Very Low	Probable	Sure	N/A
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Decommissioning phase	Layout (preferred)	Increased Dust (Negative)	Local	Low	Construction Period	Low	Very Low	Definite	Certain	Reversible
	Layout (alternative)									
	Mitigation Alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Cumulative Impact		Increased Dust (Negative)	Local	Medium	Construction Period	Medium	Low	Definite	Certain	Reversible
No-Go Option		Increased Dust (Negative)	N/A							

Table 17 Assessment of aesthetic impacts

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Construction phase	Layout (preferred)	Aesthetic Impact (Negative)	Local	Low	Construction Period	Low	Very Low	Definite	Certain	Reversible
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
	Spoil transport option 1 (Access Road to Tailrace)		Local	Medium	Construction Period	Medium	Low	Definite	Certain	Reversible
	Spoil transport option 2 (Tunnel)		Site Specific	Low	Construction Period	Very Low	Very Low	Definite	Certain	Reversible
	Spoil transport option 3 (Conveyor)		Site Specific	Low	Construction Period	Very Low	Very Low	Definite	Certain	Reversible
	Spoil transport option 4 (Haulage way/ cableway)		Site Specific	Low	Construction Period	Very Low	Very Low	Definite	Certain	Reversible
	Spoil Disposal option A		Site Specific	Zero	Long Term	Neutral	Neutral	Definite	Certain	Reversible
	Spoil disposal option B		Local	Medium	Construction Period	Medium	Low	Definite	Certain	Reversible

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Operational phase	Layout (preferred)	Aesthetic Impact (Negative)	Local	Low	Long Term	Low	Very Low	Definite	Certain	Reversible
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Decommissioning phase	Layout (preferred)	Aesthetic Impact (Negative)	Local	Low	Construction Period	Low	Very Low	Definite	Certain	Reversible
	Layout (alternative)									
	Mitigation Alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Cumulative Impact		Aesthetic Impact (Negative)	Local	Low	Construction Period	Low	Very Low	Definite	Certain	Reversible
No-Go Option		Aesthetic Impact (Negative)	N/A							

Table 18 Assessment of increased criminal activity

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Construction phase	Layout (preferred)	Increased Criminal Activity (Negative)	Regional	Low	Construction Period	Low	Very Low	Probable	Sure	Reversible
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
	Spoil transport option 1 (Access Road to Tailrace)									
	Spoil transport option 2 (Tunnel)									
	Spoil transport option 3 (Conveyor)									
	Spoil transport option 4 (Haulage way/ cableway)									
	Spoil Disposal option A									
	Spoil disposal option B									

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Operational phase	Layout (preferred)	Increased Criminal Activity (Negative)	N/A							
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Decommissioning phase	Layout (preferred)	Increased Criminal Activity (Negative)	Regional	Low	Construction Period	Low	Very Low	Probable	Sure	Reversible
	Layout (alternative)									
	Mitigation Alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Cumulative Impact		Increased Criminal Activity (Negative)	Regional	Low	Construction Period	Low	Very Low	Probable	Sure	Reversible
No-Go Option		Increased Criminal Activity (Negative)	N/A							

Table 19 Assessment of increased fire hazard

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Construction phase	Layout (preferred)	Increased Fire Hazard (Negative)	Local	High	Construction Period	Medium	Low	Definite	Certain	Reversible
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
	Spoil transport option 1 (Access Road to Tailrace)									
	Spoil transport option 2 (Tunnel)									
	Spoil transport option 3 (Conveyor)									
	Spoil transport option 4 (Haulage way/ cableway)									
	Spoil Disposal option A									
	Spoil disposal option B									

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Operational phase	Layout (preferred)	Increased Fire Hazard (Negative)	N/A							
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Decommissioning phase	Layout (preferred)	Increased Fire Hazard (Negative)	Local	High	Construction Period	Medium	Low	Definite	Certain	Reversible
	Layout (alternative)									
	Mitigation Alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Cumulative Impact		Increased Fire Hazard (Negative)	Local	High	Construction Period	Medium	Low	Definite	Certain	Reversible
No-Go Option		Increased Fire Hazard (Negative)	N/A							

Table 20 Assessment of cultural heritage

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Construction phase	Layout (preferred)	Cultural Heritage (Negative)	Site Specific	High	Construction Period	Medium	Low	Definite	Certain	Reversible
	Layout (alternative)									
	Mitigation alternative		Site Specific	Low	Construction Period	Very Low	Very Low	Definite	Certain	Reversible
	Upgraded Access Road		Site Specific	High	Construction Period	Medium	Low	Definite	Certain	Reversible
	Transmission Route 1									
	Transmission Route 2									
	Spoil transport option 1 (Access Road to Tailrace)									
	Spoil transport option 2 (Tunnel)									
	Spoil transport option 3 (Conveyor)									
	Spoil transport option 4 (Haulage way/ cableway)									
	Spoil Disposal option A									
	Spoil disposal option B									

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Operational phase	Layout (preferred)	Cultural Heritage (Negative)	Site Specific	Medium	Long Term	Medium	Low	Probable	Sure	Reversible
	Layout (alternative)									
	Mitigation alternative		Site Specific	Low	Construction Period	Very Low	Very Low	Definite	Certain	Reversible
	Upgraded Access Road		Site Specific	Medium	Long Term	Medium	Low	Probable	Sure	Reversible
	Transmission Route 1		Site Specific	Medium	Long Term	Medium	Low	Probable	Sure	Reversible
	Transmission Route 2		Site Specific	Medium	Long Term	Medium	Low	Probable	Sure	Reversible
Decommissioning phase	Layout (preferred)	Cultural Heritage (Negative)	Site Specific	High	Construction Period	Medium	Low	Definite	Certain	Reversible
	Layout (alternative)									
	Mitigation Alternative		Site Specific	Low	Construction Period	Very Low	Very Low	Definite	Certain	Reversible
	Upgraded Access Road		Site Specific	High	Construction Period	Medium	Low	Definite	Certain	Reversible
	Transmission Route 1									
	Transmission Route 2									
Cumulative Impact		Cultural Heritage (Negative)	N/A							
No-Go Option		Cultural Heritage (Negative)	N/A							

Table 21 Assessment of increased noise

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Construction phase	Layout (preferred)	Increased Noise (Negative)	Local	Medium	Construction Period	Medium	Low	Probable	Sure	Reversible
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
	Spoil transport option 1 (Access Road to Tailrace)		Local	High	Construction Period	Medium	Low	Probable	Sure	Reversible
	Spoil transport option 2 (Tunnel)		Local	High	Construction Period	Medium	Low	Probable	Sure	Reversible
	Spoil transport option 3 (Conveyor)		Site Specific	Medium	Construction Period	Low	Very Low	Probable	Sure	Reversible
	Spoil transport option 4 (Haulage way/ cableway)		Site Specific	Medium	Construction Period	Low	Very Low	Probable	Sure	Reversible
	Spoil Disposal option A		Site Specific	Medium	Construction Period	Low	Very Low	Probable	Sure	Reversible
	Spoil disposal option B		Local	Medium	Construction Period	Medium	Low	Probable	Sure	Reversible

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Operational phase	Layout (preferred)	Increased Noise (Negative)	Site Specific	Low	Long Term	Low	Very Low	Probable	Sure	Reversible
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Decommissioning phase	Layout (preferred)	Increased Noise (Negative)	Local	Medium	Construction Period	Medium	Low	Probable	Sure	Reversible
	Layout (alternative)									
	Mitigation Alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Cumulative Impact		Increased Noise (Negative)	Local	High	Construction Period	Medium	Low	Probable	Sure	Reversible
No-Go Option		Increased Noise (Negative)	N/A							

Table 22 Assessment of increased employment opportunities

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Construction phase	Layout (preferred)	Increased Employment Opportunities (Positive)	Regional	Medium	Construction Period	Medium	High	Definite	Certain	N/A
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
	Spoil transport option 1 (Access Road to Tailrace)									
	Spoil transport option 2 (Tunnel)									
	Spoil transport option 3 (Conveyor)									
	Spoil transport option 4 (Haulage way/ cableway)									
	Spoil Disposal option A									
	Spoil disposal option B									

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Operational phase	Layout (preferred)	Increased Employment Opportunities (Positive)	Regional	Low	Long Term	Medium	High	Definite	Certain	N/A
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Decommissioning phase	Layout (preferred)	Increased Employment Opportunities (Positive)	Regional	Medium	Construction Period	Medium	High	Definite	Certain	N/A
	Layout (alternative)									
	Mitigation Alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Cumulative Impact		Increased Employment Opportunities (Positive)	Regional	Medium	Long Term	High	High	Definite	Certain	N/A
No-Go Option		Increased Employment Opportunities (Positive)	N/A							

Table 23 Assessment of financial benefits for the RCT

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Construction phase	Layout (preferred)	Financial Benefits for RCT (Positive)	Regional	Medium	Construction Period	Medium	High	Definite	Certain	N/A
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
	Spoil transport option 1 (Access Road to Tailrace)									
	Spoil transport option 2 (Tunnel)									
	Spoil transport option 3 (Conveyor)									
	Spoil transport option 4 (Haulage way/ cableway)									
	Spoil Disposal option A									
	Spoil disposal option B									

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Operational phase	Layout (preferred)	Financial Benefits for RCT (Positive)	Regional	Medium	Long Term	High	High	Definite	Certain	N/A
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Decommissioning phase	Layout (preferred)	Financial Benefits for RCT (Positive)	Regional	Medium	Construction Period	Medium	High	Definite	Certain	N/A
	Layout (alternative)									
	Mitigation Alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Cumulative Impact		Financial Benefits for RCT (Positive)	Regional	Medium	Long Term	High	High	Definite	Certain	N/A
No-Go Option		Financial Benefits for RCT (Positive)	N/A							

Table 24 Assessment of increased opportunities for SMEs

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Construction phase	Layout (preferred)	Increased Opportunities for SMEs (Positive)	Regional	Low	Construction Period	Low	Medium	Probable	Sure	N/A
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
	Spoil transport option 1 (Access Road to Tailrace)									
	Spoil transport option 2 (Tunnel)									
	Spoil transport option 3 (Conveyor)									
	Spoil transport option 4 (Haulage way/ cableway)									
	Spoil Disposal option A									
	Spoil disposal option B									

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Operational phase	Layout (preferred)	Increased Opportunities for SMEs (Positive)	Regional	Low	Long Term	Medium	Medium	Probable	Sure	N/A
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Decommissioning phase	Layout (preferred)	Increased Opportunities for SMEs (Positive)	Regional	Low	Construction Period	Low	Medium	Probable	Sure	N/A
	Layout (alternative)									
	Mitigation Alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Cumulative Impact		Increased Opportunities for SMEs (Positive)	Regional	Low	Long Term	Low	Medium	Probable	Sure	N/A
No-Go Option		Increased Opportunities for SMEs (Positive)	N/A							

Table 25 Assessment of increased opportunities for informal traders

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Construction phase	Layout (preferred)	Increased Opportunities for Informal Traders (Positive)	Local	Very Low	Construction Period	Very Low	Low	Unlikely	Unsure	N/A
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
	Spoil transport option 1 (Access Road to Tailrace)									
	Spoil transport option 2 (Tunnel)									
	Spoil transport option 3 (Conveyor)									
	Spoil transport option 4 (Haulage way/ cableway)									
	Spoil Disposal option A									
	Spoil disposal option B									

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Operational phase	Layout (preferred)	Increased Opportunities for Informal Traders (Positive)	N/A							
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Decommissioning phase	Layout (preferred)	Increased Opportunities for Informal Traders (Positive)	Local	Very Low	Construction Period	Very Low	Low	Unlikely	Unsure	N/A
	Layout (alternative)									
	Mitigation Alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Cumulative Impact		Increased Opportunities for Informal Traders (Positive)	Local	Very Low	Construction Period	Very Low	Low	Unlikely	Unsure	N/A
No-Go Option		Increased Opportunities for Informal Traders (Positive)	N/A							

Table 26 Assessment of the temporary and permanent loss of land

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Construction phase	Layout (preferred)	Temporary and Permanent Loss of Land (Negative)	Local	Low	Construction Period	Low	Very Low	Definite	Certain	Reversible
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
	Spoil transport option 1 (Access Road to Tailrace)									
	Spoil transport option 2 (Tunnel)									
	Spoil transport option 3 (Conveyor)									
	Spoil transport option 4 (Haulage way/ cableway)									
	Spoil Disposal option A									
	Spoil disposal option B									

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Operational phase	Layout (preferred)	Temporary and Permanent Loss of Land (Negative)	Local	Low	Long Term	Low	Very Low	Definite	Certain	Reversible
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Decommissioning phase	Layout (preferred)	Temporary and Permanent Loss of Land (Negative)	N/A							
	Layout (alternative)									
	Mitigation Alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Cumulative Impact		Temporary and Permanent Loss of Land (Negative)	N/A							
No-Go Option		Temporary and Permanent Loss of Land (Negative)	N/A							

Table 27 Assessment of the temporary disruption to farming activities

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Construction phase	Layout (preferred)	Temporary Disruption to Farming Activities (Negative)	Local	Low	Construction Period	Low	Very Low	Definite	Certain	Reversible
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
	Spoil transport option 1 (Access Road to Tailrace)									
	Spoil transport option 2 (Tunnel)									
	Spoil transport option 3 (Conveyor)									
	Spoil transport option 4 (Haulage way/ cableway)									
	Spoil Disposal option A									
	Spoil disposal option B									

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Operational phase	Layout (preferred)	Temporary Disruption to Farming Activities (Negative)	N/A							
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Decommissioning phase	Layout (preferred)	Temporary Disruption to Farming Activities (Negative)	N/A							
	Layout (alternative)									
	Mitigation Alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Cumulative Impact		Temporary Disruption to Farming Activities (Negative)	N/A							
No-Go Option		Temporary Disruption to Farming Activities (Negative)	N/A							

Table 28 Assessment of the establishment of a broad based community trust

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Construction phase	Layout (preferred)	Establishment of a Broad Based Community Trust (Positive)	N/A							
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
	Spoil transport option 1 (Access Road to Tailrace)									
	Spoil transport option 2 (Tunnel)									
	Spoil transport option 3 (Conveyor)									
	Spoil transport option 4 (Haulage way/ cableway)									
	Spoil Disposal option A									
	Spoil disposal option B									

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Operational phase	Layout (preferred)	Establishment of a Broad Based Community Trust (Positive)	Regional	Medium	Long Term	High	High	Probable	Sure	N/A
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Decommissioning phase	Layout (preferred)	Establishment of a Broad Based Community Trust (Positive)	N/A							
	Layout (alternative)									
	Mitigation Alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Cumulative Impact		Establishment of a Broad Based Community Trust (Positive)	Regional	Medium	Long Term	High	High	Probable	Sure	N/A
No-Go Option		Establishment of a Broad Based Community Trust (Negative)	Regional	High	Long Term	High	High	Definite	Sure	N/A

Table 29 Assessment of Socio-Economic Development (SED) Spend

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Construction phase	Layout (preferred)	Socio-Economic Development (SED) Spend (Positive)	N/A							
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
	Spoil transport option 1 (Access Road to Tailrace)									
	Spoil transport option 2 (Tunnel)									
	Spoil transport option 3 (Conveyor)									
	Spoil transport option 4 (Haulage way/ cableway)									
	Spoil Disposal option A									
	Spoil disposal option B									

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Operational phase	Layout (preferred)	Socio-Economic Development (SED) Spend (Positive)	Regional	Medium	Long Term	High	High	Probable	Sure	N/A
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Decommissioning phase	Layout (preferred)	Socio-Economic Development (SED) Spend (Positive)	N/A							
	Layout (alternative)									
	Mitigation Alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Cumulative Impact		Socio-Economic Development (SED) Spend (Positive)	Regional	Medium	Long Term	High	High	Probable	Sure	N/A
No-Go Option		Socio-Economic Development (SED) Spend (Negative)	Regional	High	Long Term	High	High	Definite	Sure	N/A

Table 30 Assessment of improved energy benefits

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Construction phase	Layout (preferred)	Improved Energy Benefits (Positive)	N/A							
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
	Spoil transport option 1 (Access Road to Tailrace)									
	Spoil transport option 2 (Tunnel)									
	Spoil transport option 3 (Conveyor)									
	Spoil transport option 4 (Haulage way/ cableway)									
	Spoil Disposal option A									
	Spoil disposal option B									

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Operational phase	Layout (preferred)	Improved Energy Benefits (Positive)	Regional	Low	Long Term	Medium	Medium	Probable	Sure	N/A
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Decommissioning phase	Layout (preferred)	Improved Energy Benefits (Positive)	N/A							
	Layout (alternative)									
	Mitigation Alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Cumulative Impact		Improved Energy Benefits (Positive)	Regional	Low	Long Term	Medium	Medium	Probable	Sure	N/A
No-Go Option		Improved Energy Benefits (Positive)	N/A							

Table 31 Assessment of possible negative impact on tourism

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Construction phase	Layout (preferred)	Impact on Tourism (Negative)	Local	Medium	Construction Period	Medium	Low	Probable	Sure	N/A
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
	Spoil transport option 1 (Access Road to Tailrace)									
	Spoil transport option 2 (Tunnel)									
	Spoil transport option 3 (Conveyor)									
	Spoil transport option 4 (Haulage way/ cableway)									
	Spoil Disposal option A									
	Spoil disposal option B									

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Operational phase	Layout (preferred)	Impact on Tourism (Negative)	Local	Very Low	Long Term	Low	Very Low	Probable	Sure	N/A
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Decommissioning phase	Layout (preferred)	Impact on Tourism (Negative)	Local	Medium	Construction Period	Medium	Low	Probable	Sure	N/A
	Layout (alternative)									
	Mitigation Alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Cumulative Impact		Impact on Tourism (Negative)	Local	Medium	Short Term	Medium	Low	Probable	Sure	N/A
No-Go Option		Impact on Tourism (Negative)	N/A							

Table 32 Assessment of possible increased tourism opportunities

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Construction phase	Layout (preferred)	Increased Tourism Opportunities (Positive)	N/A							
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
	Spoil transport option 1 (Access Road to Tailrace)									
	Spoil transport option 2 (Tunnel)									
	Spoil transport option 3 (Conveyor)									
	Spoil transport option 4 (Haulage way/ cableway)									
	Spoil Disposal option A									
	Spoil disposal option B									

	Project	Key impacts	Extent	Magnitude	Duration	SIGNIFICANCE (Without mitigation)	SIGNIFICANCE (With Mitigation)	Probability	Confidence	Reversibility
Operational phase	Layout (preferred)	Increased Tourism Opportunities (Positive)	Local	Very Low	Long Term	Very Low	Low	Probable	Sure	N/A
	Layout (alternative)									
	Mitigation alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Decommissioning phase	Layout (preferred)	Increased Tourism Opportunities (Positive)	N/A							
	Layout (alternative)									
	Mitigation Alternative									
	Upgraded Access Road									
	Transmission Route 1									
	Transmission Route 2									
Cumulative Impact		Increased Tourism Opportunities (Positive)	Local	Low	Long Term	Low	Low	Probable	Sure	N/A
No-Go Option		Increased Tourism Opportunities (Positive)	N/A							

10.2 Mitigation and management of socio-economic impacts during preconstruction and construction

10.2.1 Increased spread in disease

- ❒ An HIV and AIDS awareness/education component should be included in the induction programme for all personnel working on the proposed project.
- ❒ Ensure there is easy access to HIV and AIDS related information and condoms for all workers involved with the proposed project.

10.2.2 Reduced road safety

- ❒ Develop a traffic management plan or include a traffic management section within the EMPr, including maximum speed limits dependent on the type of vehicle.
- ❒ Ensure that the road is maintained in a good condition at all times and is not allowed to deteriorate.
- ❒ Prior to construction commencing, ensure that the road is widened to a suitable width.
- ❒ All drivers should be briefed regarding the traffic management plan.
- ❒ Local residents should be informed prior to any abnormal load vehicles making use of the road.

10.2.3 Increased pressure on existing infrastructure and services

- ❒ Upgrading and maintenance of road infrastructure to be used by the project before construction.
- ❒ Establishment of a Community Management and Monitoring Committee (CMMC) to act as a communication link between the local community and the project proponent, in this case, in relation to damaged infrastructure.

10.2.4 Increased dust

- ❒ Dust on the construction sites should be controlled by means of water spray vehicles.
- ❒ Dust on access roads should be controlled by means of water spray vehicles, especially prior to movement of heavy duty or haulage vehicles.
- ❒ Farmers should be consulted on a case by case basis to discuss likely impacts and to determine if preventative measures are required.

10.2.5 Aesthetic impact

- ❒ Ensure that the construction site is left in a tidy manner at the close of work every day.
- ❒ Ensure that efforts are made to reduce the visibility of construction materials through the use of camouflaged netting and/or tarpaulins.
- ❒ All visible infrastructure should be constructed in such a way so as to reduce the visual impact.

10.2.6 Increased criminal activity

- ❒ Construction teams should be clearly identified by wearing uniforms and/or wearing identification cards that should be exhibited in a visible place on their body.
- ❒ Construction workers should be accommodated in a nearby town and not on site.
- ❒ Instant dismissal and prosecution of any staff caught in criminal activities of any kind (including the poaching of plants and animals).
- ❒ Establishment of a CMMC to act as a communication link between the local community and the project proponent, in this case, in relation to criminal activity.
- ❒ Inform local law enforcement agencies of the possibilities of increased criminal activity in the area.

10.2.7 Increased fire hazard

- ❒ Ensure that no fires are allowed on site.

10.2.8 Cultural heritage

- ❒ Areas of cultural heritage and historical significance should be clearly demarcated prior to construction.
- ❒ Construction workers should be briefed about the importance of remaining clear of areas of cultural heritage and historical significance.
- ❒ Fines should be imposed on contractors and or construction workers found to be damaging areas of cultural heritage and historical significance.
- ❒ In the event of chance finds, all work in the area of the find is to cease and SAHRA is to be contacted to provide direction on a way forward.

10.2.9 Increased noise

- ❒ Noise suppression techniques should be used as far as possible.
- ❒ Avoid construction after daylight hours.
- ❒ Advanced warning should be provided to landowners and the AFNP prior to any blasting taking place.

10.2.10 Increased employment opportunities

- ❒ Ensure that the requirements set out by the Independent Power Producer Process are strictly adhered to.
- ❒ Consult with local government and community organisations regarding the hiring of local labour.
- ❒ Employ a community liaison officer to assist in the communication between the local communities and the project proponent.

10.2.11 Financial benefits for RCT

- ❒ Ensure that the agreed conditions are adhered to.
- ❒ Ensure that any monies paid to the RCT are used for community upliftment.

10.2.12 Increased opportunities for SMEs

- ❒ Identify which services could be supplied by local SMEs and contractors.
- ❒ In consultation with local government and community organisation, identify SMEs and contractors who could supply the required services.
- ❒ Endeavour to employ local contractors and SMEs as far as is feasibly possible.

10.2.13 Increased opportunities for informal traders

- ❒ In conjunction with the local municipality, ensure that refuse disposal facilities are available.

10.2.14 Temporary and permanent loss of land

- ❒ Ensure that there is sufficient consultation with the affected landowners.
- ❒ Ensure that landowners are paid out for any permanent loss at market value.
- ❒ Ensure that landowners are compensated for any temporary loss to land.

10.2.15 Temporary disruption to farming activities

- ❒ Ensure there is sufficient consultation with affected landowners.
- ❒ Ensure affected landowners are informed well in advance prior to any construction taking place on their land.
- ❒ Endeavour to conduct construction activities associated with transmission lines out of season and not during peak growing or harvesting time so that disruptions are kept to a minimum.
- ❒ Where possible, align transmission lines in existing servitudes.
- ❒ Ensure that landowners are compensated for any temporary loss to land and/or damages to infrastructure or crops caused during the construction process.

10.2.16 Potential negative impacts on tourism

- ❒ Noise suppression techniques should be used as far as possible.
- ❒ Avoid construction after daylight hours.
- ❒ Advanced warning should be provided to landowners and the AFNP prior to any blasting taking place.
- ❒ Prior to heavy duty vehicle accessing the project site for maintenance purposes, dust suppression techniques should be used on the access road.
- ❒ Ensure that strict speed limits are adhered to by all project vehicles to reduce dust.
- ❒ Ensure that sound proofing is installed on all components of the project likely to make a significant noise.
- ❒ Ensure that all components of the project which may be visible are designed in such a manner so as to reduce the visual impact.

10.3 Mitigation and management of socio-economic impacts operation

10.3.1 Increased dust

- ❒ Prior to heavy duty vehicle accessing the project site for maintenance purposes, dust suppression techniques should be used on the access road.
- ❒ Ensure that strict speed limits are adhered to by all project vehicles to reduce dust.

10.3.2 Cultural heritage

- ❒ Ensure that areas of cultural heritage and areas of historical significance are clearly identifiable and avoided by project staff.

10.3.3 Increased noise

- ❒ Ensure that sound proofing is installed on all components of the project likely to make a significant noise.
- ❒ Inform local landowners and the AFNP prior to any maintenance work which may cause noise.

10.3.4 Aesthetic impacts

- ❒ Ensure that all components of the project which may be visible are designed in such a manner so as to reduce the visual impact.
- ❒ The AFNP should be informed well in advance of any major maintenance taking place.

10.3.5 Increased employment opportunities

- ❒ Endeavour to train and employ local people as far as is feasibly possible.
- ❒ Embark on skills development training for potential employees from local communities.
- ❒ Maintain clear lines of communication between the project proponent and local communities regarding employment opportunities.

10.3.6 Broad based community trust

- ❒ The project proponent should have representatives on the trust committee.
- ❒ Ensure that there are no irregularities with the spending of monies received.
- ❒ Ensure that all monies received are used for community upliftment purposes.

10.3.7 Socio-Economic Development (SED) Spend

- ❒ Ensure that there are no irregularities with the spending of monies received.
- ❒ Ensure that all monies received are used for community upliftment purposes.

10.3.8 Financial benefits for the RCT

- ❒ Ensure that there are no irregularities with the spending of monies received by the RCT.
- ❒ Ensure that all monies received by the RCT are used for community upliftment purposes.

10.3.9 Improved energy production

- Ensure that the project infrastructure is well maintained to ensure the efficient functioning of the project throughout its life span.

10.3.10 Potential negative impact on tourism

- Ensure that the proposed plans regarding minimum flow volumes reaching Augrabies Falls are abided by.
- The AFNP should be informed well in advance of any major maintenance taking place.

10.3.11 Potential positive impacts on tourism

- Ensure that tours of the hydroelectric scheme are well marketed.
- Ensure that guides are well trained and can provide tourists with the necessary information.

11. BENEFIT SHARING

Through the assessment of the socio-economic conditions prevailing in the study area and discussions with the Kai !Garib LM LED and tourism officer, members of the Augrabies community, members of the Riemvasmaak community, and the acting chairperson and trustees of the RCT, the following benefit sharing opportunities have been identified.

11.1 Support for existing projects

Various projects were identified in the Riemvasmaak area, which are currently in place and which would benefit from any form of assistance, including financial and/or professional expertise. Existing projects include the development and implementation of a tourism master plan for the Riemvasmaak area, the upgrading of the Vaaldrift farm for grape farming and the development of an 80 ha vineyard in Vredesvallei.

11.2 Education

A lack of secondary schools for the communities of Riemvasmaak, Augrabies and Marchand has been identified as a major factor prohibiting development (Ms Cloete and Mr Remarha, personal communication). It was noted that, at present, learners need to travel to Kakamas in order to attend secondary school, which is a financial burden for parents and often not a feasible option. As a result, there are a large number of learners in the area not completing secondary school. There is potentially scope here for the project proponent to assist in the upgrading of existing schools enabling the schools to continue through to grade 12.

In the case of schools in Augrabies it was noted that the existing schools are located on private property but are government schools. As a result, Government is reluctant to provide funding for the maintenance of these schools (Ms Cloete and Mr Remarha, personal communication). There is the opportunity for the project proponent to assist in the maintenance of these schools.

A further factor identified as limiting access to tertiary education is a lack of funding for learners. The opportunity exists for scholarships to be provided to learners who are identified as having the potential to complete tertiary training. This could be extended to a skills development programme whereby the project proponent identifies employment requirements and provides scholarships to suitable learners to study a relevant degree. This could then be followed by an agreed period of employment with the project proponent.

11.3 Training and skills development

Through the proposed project, members of the local communities should receive skills training. This should take place during the construction process, thus, allowing for the employees to be more employable following the completion of construction. The need for training and skills development is particularly the case amongst women (Ms Cloete, personal communication).

11.4 Need for the construction of public spaces and sports fields

The lack of public spaces and sports fields for the youth was identified as an area of concern (Ms Cloete, personal communication). The construction of such facilities is a possible option for the project proponent to consider.

11.5 Provision of services

As discussed in Section 7, there are various service delivery backlogs within the Kai !Garib LM, including access to piped water, access to sanitation and access to electricity. In addition, there are other backlogs such as in the healthcare services. This lack of access to services within the communities surrounding the project site presents various benefit sharing options for the project proponent.

12. CONCLUSIONS AND RECOMMENDATIONS

12.1 Conclusions

RVM 1 Hydro Electric Power (Pty) Ltd intends to construct a 40 MW hydropower station on the Orange River. It is proposed that the development take place on the farm Riemvasmaak (Portion 1 of Farm no. 498) and Remainder of Farm no. 497, approximately 40 km north-west of Kakamas in the Northern Cape Province of South Africa. Access to the land for the proposed project is controlled by the AFNP. In an effort to reduce the impact on AFNP the majority of the project infrastructure will be buried underground while the weir has been designed in such a manner to ensure that a minimum flow of 30m³/s, assuming that there is this amount of water in the river, will always be channelled to the falls.

The surrounding socio-economic environment is characterised by high levels of poverty and unemployment while there is generally access to services including education and in particular tertiary education. In line with the IPP Procurement Process the project proponent is required to satisfy a number of economic development requirements, ranging from local ownership of the project and preferential procurement to enterprise and socio-economic development. In addition it is anticipated that the project will generate in the region of 150 – 200 temporary jobs during the construction process, expected to last 36 months. The majority of these jobs will be sourced from the local communities. In communities where unemployment and poverty levels are high the possibility of employment for 36 months is of significant benefit to the local population. During the operating phase of the project it is anticipated that between five and ten permanent jobs will be created. Following the required training, only one of the permanent jobs would not be local. If the project is managed correctly, there is potential for the socio-economic benefits of the project to be far reaching and sustainable and continue to benefit future generations.

On completion of this study, it can be confirmed that there are no fatal flaw or potential red flags from a socio-economic perspective (nevertheless, sensitivity needs to be applied to visual and noise aspects). There are however likely to be various negative impacts associated with the proposed project especially considering its location within a National Park. While the biggest concern raised was the impact that a slightly reduced flow would have on Augrabies Falls and therefore its attraction to tourists, from the research it appears this concern is largely immaterial. It should be noted that through this research it has been established that the only direct correlation between flow volumes and visitors to the park is during times of flood and that the proposed project will have no noticeable effect on the falls during times of flood. As such the impact of a slight decrease in volume of water passing over the falls will not impact tourism. Of greater concern are issues such as the impact of noise, dust and aesthetic impacts on the park during the construction process and the impact which these may have on current and future tourism. These impacts also need to be considered for the community at large. As such the following recommendations are made:

12.2 Recommendations

While all impacts identified should be mitigated as far as possible it is recommended that specific attention is paid to the following points.

Employment creation

Jobs should be sourced locally and in line with the IPP Procurement Programme. In addition to this every effort should be made to ensure that skills development takes place and that as many people are provided with permanent employment on the project as soon as possible. A community liaison officer needs to be appointed in order to mediate between the contractor and/or the project proponent and the local communities.

Economic benefits

Measures need to be put in place to ensure that the income generated for the RCT from rental and dividends is put towards the upliftment of the community at large.

Visual impacts

Efforts should be made to ensure that visual impacts are kept to a minimum during the construction process and during the operational phase of the project. Of particular concern is the proposed location of the new sub-station which is currently adjacent to the existing 497/0 property fence line. At present it is planned that the transmission lines will surface adjacent to the boundary. In terms of the potential visual impact it is proposed that these lines continue underground for a small distance before surfacing in order to create a buffer between the fence line and the electrical infrastructure.

Noise

It is understood that a noise impact study has been conducted for the proposed project and found that considering the distance from noise sensitive receptors it was deemed of little significance and therefore not reviewed in the EIA phase. Concerns were however raised by representatives of AFNP as well as the tourism sector. Concerns did not only relate the impact on the tourism sector and local inhabitants but also the fauna in the area.

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Mr F van Rooyen – Augrabies Falls Nation Park, Park Manager (16/09/2013 & 20/09/2013)

Mr K Remarha – Headmaster in Augrabies Town (17/09/2013)

Mr H Basson – Riemvasmaak Tourism Association (18/09/2013)

Mr R Romaan – Riemvasmaak community member (18/09/2013)

Mr W Remarha – Riemvasmaak community member (18/09/2013)

Mr B Vas – Riemvasmaak community member (19/09/2013)

Mr W Klim – Kai !Garib Local Municipality, Ward 1 Ward Councillor (19/09/2013)

Mr G Page – Tourism Consultant, Northern Cape (20/09/2013).