ENVIRONMENTAL IMPACT STATEMENT
MMAMABULA TRANSMISSION LINE

VOLUME 2 OF 3

CIC ENERGY CORP.

MARCH 2007

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APPENDIX A

MAPS & PLANS
Plan 3

Map Projection and Coordinate System

Projection method: Transverse Mercator
Spheroid: Clarke 1880/Cape Datum
Central meridian: Lo 27
Map Projection and Coordinate System

Grid: UTM Zone 35
Projection method: Transverse Mercator
Spheroid: Clarke 1880/Cape Datum, RSA
Central meridian: Lo 27
False Co-ords: E500 000m, N10 000 000m

Limpopo River
APPENDIX B

TERMS OF REFERENCE
Contributions to the compilation of the Terms of Reference have been made by the following consultants:

ECO-LAW, CIC ENERGY CORP, ENVIRONMENTAL RESOURCES MANAGEMENT
EXECUTIVE SUMMARY

Southern Africa is expected to experience power shortages within the near future, it is therefore, crucial that new power supply projects are identified and developed. The Mmamabula Energy Project (MEP) is estimated to have sufficient coal reserves to operate a power plant of between 2400MW and 4800MW for a minimum of 40 years. A prerequisite for the operation of this power plant is a transmission network, with which to transport the generated electricity. The construction of transmission lines is therefore critical to the MEP. The Terms of Reference (ToR) discussed here addresses the scope of work necessary for the completion of the Environmental Impact Assessment (EIA) for the transmission lines associated with the MEP.

The transmission network will comprise one 400kV line going north from the power plant to Phokoje, outside Selebi-Phikwe, via Mahalapye and the Moropule sub-station on the outskirts of Palapye. A 400kV line will also run south connecting into the proposed Mosaditshweni sub-station, approximately 60km north of Gaborone. In addition four 400kV lines will run east from the power plant to the South African border. These will be separated, by a minimum of 2km, into two corridors, each containing two lines. There are two route alternatives that will be considered for the corridor to Palapye as well as two alternatives for the route to the South African border. In the latter case, there is a possibility that both alternatives may be utilised.

Various impacts have been identified for both the construction and operational phases of the project. Decommissioning has not been considered in great detail as although the expected life of the MEP is approximately 40 years, the transmission network may then be connected into power productions that are developed in the future. It is, therefore, likely that the transmission network will be in existence indefinitely. Key impacts associated with the construction phase include the disturbance of agriculture, clearing of vegetation, increased vehicles and people as well as dust and noise generation. Most of these impacts will be temporary and will be reduced or corrected after the construction phase. The most severe impacts associated with operation will be the visual intrusion on the landscape, the potential negative impact on the avifauna of the region and a limited amount of permanent vegetation removal, which will have the greatest impact in riparian habitats where trees greater than 4m may have to be removed. There may also be a few, isolated relocations of households where they are situated directly on a section of the proposed routes that cannot be deviated. The greatest positive impact will be the increased capacity of the Botswana grid and the export capability provided to South Africa. All these impacts will be assessed, together with mitigation and management recommendations in the EIA.

The findings of the EIA will be presented in the Environmental Impact Statement (EIS) that will be submitted to the Botswana Department of Environmental Affairs (DEA) by the end of February 2007.
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1 INTRODUCTION

Meeppong Resources (Pty) Ltd (Meeppong) and Meeppong Energy (Pty) Ltd are Botswana companies wholly owned by CIC Energy Corp (CIC). Meeppong has the rights to explore for coal resources in the Mmamabula coal field, Central District, Botswana. This proposed project is referred to as the Mmamabula Energy Project (MEP) and, if approved, will include the development of underground coal mines; the construction of a power plant; and the development of transmission lines to carry power to areas of Botswana and to South Africa.

This report focuses on scope of the Environmental Impact Assessment (EIA) process for the transmission line proposed for the transport of power generated by the Mmamabula Power Plant. The Terms of References for the coal mine and power plant are being addressed separately. The transmission line referred to in this document will be funded by CIC Energy Corporation, constructed by Trans Africa Projects (TAP) and maintained by Botswana Power Corporation (BPC).

1.1 Definition of Activity

The MEP will involve the development of a power plant with transmission lines carrying some of this power to areas of Botswana, however, as the total electrical load in Botswana will be in the order of 800MW on completion of the power station, the majority of the power generated will be exported to South Africa, where the demand is greatest. A 400kV transmission line will run from the Mmamabula Power Plant in a north easterly direction to the Moropule Substation near Palapye and then on to the Phokoje Substation near Selebi-Phikwe; in a south westerly direction to Mosaditshweni; and four 400kV lines will run in an easterly direction to the South African border, and across into South Africa.

The activities covered by the Terms of Reference described in this report relate specifically to the development and operation of the proposed transmission lines within Botswana.

1.2 Purpose of the Terms of Reference

The purpose of these Terms of Reference is to correlate the information required by the Government of Botswana and appropriate stakeholders for an Environmental Impact Assessment (EIA) and subsequent Environmental Impact Statement (EIS). The Terms of Reference will be used to guide the EIA team during their studies and to help with the evaluation of the EIS.

The Terms of Reference outlines the actions that will be taken for an EIA report, to meet all legal, procedural and technical requirements of the developer. Digby Wells & Associates (DWA), on behalf of BPC, will prepare and submit an EIA report, which will identify and describe the biophysical, cultural and socio-economic effects of the construction, operational and
decommissioning phases of the proposed project, to the Department of Environmental Affairs (DEA).

1.3 Applicant Details
The contact details of the Botswana Power Corporation (BPC) are given below in Table 1:

Table 1: Applicant contact details

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Mmamabula Energy Project - Transmission EIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company Name</td>
<td>Botswana Power Corporation</td>
</tr>
<tr>
<td>Contact Name</td>
<td>Jimson Lekanyang</td>
</tr>
<tr>
<td>Postal Address</td>
<td>P.O. Box 48, Gaborone, Botswana</td>
</tr>
<tr>
<td>Physical Address</td>
<td>Motlakase House, Macheng Way, Gaborone, Botswana</td>
</tr>
<tr>
<td>Telephone</td>
<td>+(267) 3603240</td>
</tr>
<tr>
<td>Fax</td>
<td>+(267) 3908674</td>
</tr>
<tr>
<td>Email Address</td>
<td><a href="mailto:lekanyangj@bpc.bw">lekanyangj@bpc.bw</a></td>
</tr>
<tr>
<td>Botswana Contact Details</td>
<td>N/A</td>
</tr>
</tbody>
</table>

1.4 Qualification of Consultant
Digby Wells & Associates (DWA) is an independent and professional consulting company which has no financial interest in this project. DWA is based in Johannesburg, South Africa and is working with Environmental Resources Management (ERM) and other sub-contractors on the project. The company profiles of all the companies involved in the environmental impact assessment part of this project are given in Appendix A. DWA is also working with specialists from Botswana and, together these teams will ensure that the different environmental and social impacts of the proposed project are carefully considered. Where negative impacts are identified by the specialists, measures will be developed to avoid or minimise these impacts. Benefits arising from the project will be maximised. The contact details of the consultants are provided in Table 2:
### Table 2: Contact details of the consultants

<table>
<thead>
<tr>
<th>Aspect</th>
<th>EIA Project Managers; Fauna &amp; flora; surface water; groundwater; TOR &amp; EIS report compilation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company Name</td>
<td>Digby Wells &amp; Associates</td>
</tr>
<tr>
<td>Contact Name</td>
<td>Mr Charles Wells</td>
</tr>
<tr>
<td>Postal Address</td>
<td>Private Bag X10046, Randburg, 2125, Johannesburg, South Africa</td>
</tr>
<tr>
<td>Physical Address</td>
<td>Fern Isle, Section 9, 359 Pretoria Ave, Randburg, 2125, Johannesburg, South Africa</td>
</tr>
<tr>
<td>Telephone</td>
<td>+27 (0)11 789 9495</td>
</tr>
<tr>
<td>Fax</td>
<td>+27 (0)11 789 9498</td>
</tr>
<tr>
<td>Email</td>
<td><a href="mailto:charles@digbywells.co.za">charles@digbywells.co.za</a></td>
</tr>
<tr>
<td>Aspect</td>
<td>Advisory; EIA report compilation</td>
</tr>
<tr>
<td>Company Name</td>
<td>Environmental Resource Management</td>
</tr>
<tr>
<td>Contact Name</td>
<td>Paul Whincup</td>
</tr>
<tr>
<td>Postal Address</td>
<td>Postnet Suite #264, Private Bag X 29, Gallo Manor, 2052</td>
</tr>
<tr>
<td>Physical Address</td>
<td>Building 23, 2nd Floor, The Woodland, Woodlands Drive, Woodmead, South Africa</td>
</tr>
<tr>
<td>Telephone</td>
<td>+27 (0)11 802 8263</td>
</tr>
<tr>
<td>Fax</td>
<td>+27 (0)11 802 8299</td>
</tr>
<tr>
<td>Email</td>
<td><a href="mailto:paul.whincup@erm.com">paul.whincup@erm.com</a></td>
</tr>
<tr>
<td>Aspect</td>
<td>Environmental Law</td>
</tr>
<tr>
<td>Company Name</td>
<td>Ecolaw</td>
</tr>
<tr>
<td>Contact Name</td>
<td>Lucy Koeslag</td>
</tr>
<tr>
<td>Postal Address</td>
<td>Unit 40, Private Bag X16, Honeydew, 2040, Johannesburg, South Africa</td>
</tr>
<tr>
<td>Physical Address</td>
<td>Fern Isle, Section 8, 359 Pretoria Ave, Randburg, 2125, Johannesburg, South Africa</td>
</tr>
<tr>
<td>Telephone</td>
<td>+27 (0)11 886 6268</td>
</tr>
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### Terms of Reference – MEP Transmission Line

<table>
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<tr>
<th>Aspect</th>
<th>Avifauna</th>
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<tbody>
<tr>
<td>Company Name</td>
<td>Endangered Wildlife Trust</td>
</tr>
<tr>
<td>Contact Name</td>
<td>Chris van Rooyen</td>
</tr>
<tr>
<td>Postal Address</td>
<td>Private Bag X11, Parkview, 2122, Johannesburg, South Africa</td>
</tr>
<tr>
<td>Physical Address</td>
<td>Johannesburg Zoo, Erlswold Way, Saxonwold, 2195, Johannesburg, South Africa</td>
</tr>
<tr>
<td>Telephone</td>
<td>+27 (0)11 486 1102</td>
</tr>
<tr>
<td>Fax</td>
<td>+27 (0)11 486 1506</td>
</tr>
<tr>
<td>Email</td>
<td><a href="mailto:chrisv@ewt.org.za">chrisv@ewt.org.za</a></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Geographical Information Systems</th>
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<tbody>
<tr>
<td>Company Name</td>
<td>MetroGIS</td>
</tr>
<tr>
<td>Contact Name</td>
<td>Lourens du Plessis</td>
</tr>
<tr>
<td>Postal Address</td>
<td>PO Box 384, La Montagne, 0184, Pretoria, South Africa</td>
</tr>
<tr>
<td>Physical Address</td>
<td>Office 222, Building 17b, CSIR, Meiring Naude Road, Pretoria, South Africa</td>
</tr>
<tr>
<td>Telephone</td>
<td>+27 (0)12 349 2884</td>
</tr>
<tr>
<td>Fax</td>
<td>+27 (0)12 349 2880</td>
</tr>
<tr>
<td>Email</td>
<td><a href="mailto:lourens@metrogis.co.za">lourens@metrogis.co.za</a></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Visual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company Name</td>
<td>Cave, Klapwijk &amp; Associates</td>
</tr>
<tr>
<td>Contact Name</td>
<td>Menno Klapwijk</td>
</tr>
<tr>
<td>Postal Address</td>
<td>P O Box 11651, Hatfield, 0028, Pretoria, South Africa</td>
</tr>
<tr>
<td>Physical Address</td>
<td>891 Duncan Street, Brooklyn, 0011, Pretoria, South Africa</td>
</tr>
<tr>
<td>Telephone</td>
<td>+27 (0)12 362 4684</td>
</tr>
<tr>
<td>Fax</td>
<td>+27 (0)12 362 0394</td>
</tr>
</tbody>
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### Terms of Reference – MEP Transmission Line

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Archaeological</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company Name</td>
<td>Archaeology Contracts Office, SA National Museum in conjunction with Geoarchaeology Research Group Pty Ltd. who are affiliated with the Botswana Department of National Museums, Monuments and Art Gallery (DNMMAG).</td>
</tr>
<tr>
<td>Contact Name</td>
<td>Karen van Ryneveld (SA National Museum) Casmir Kethlalefile (Geoarchaeology Research Group)</td>
</tr>
<tr>
<td>Postal Address</td>
<td>P.O. Box 266, Bloemfontein, 9300, South Africa (SA National Museum).</td>
</tr>
<tr>
<td>Physical Address</td>
<td>Nasionale Museum, 36 Aliwal Straat, Bloemfontein, South Africa (SA National Museum)</td>
</tr>
<tr>
<td>Telephone</td>
<td>+27 (0)51 447 9609 (SA National Museum) +267-3924328 (Geoarchaeology Research Group)</td>
</tr>
<tr>
<td>Fax</td>
<td>+27 (0)51 447 6273 (SA National Museum) +267-3927990 (Geoarchaeology Research Group)</td>
</tr>
<tr>
<td>Email</td>
<td><a href="mailto:cka@mweb.co.za">cka@mweb.co.za</a> (SA National Museum) karennasmus.co.za (SA National Museum) <a href="mailto:ckethlalefile@alumnimail.albion.edu">ckethlalefile@alumnimail.albion.edu</a> (Geoarchaeology Research Group)</td>
</tr>
</tbody>
</table>
2 IMPACT ASSESSMENT METHODOLOGY

In order to adequately assess and evaluate the impacts and benefits that will be associated with a proposed project, it is necessary to develop a methodology that will scientifically achieve this and reduce the subjectivity involved in making such evaluations. Legal requirements and clearly defined criteria must be implemented in order to accurately determine the significance of the predicted impact or benefit on the surrounding natural and/or social environment. For this to be done, the context of the project must be considered according to the area and the people that will be affected.

Of necessity, impact assessment will always contain a degree of subjectivity, as it is based on the value judgment of various specialists and members of society. The evaluation of significance is thus contingent upon values, and dependant upon the environmental and community context. Therefore, ultimately, impact significance involves a process of determining the acceptability of a predicted impact to society.

The purpose of impact assessment and mitigation is to identify and evaluate the likely extent and significance of the potential impacts on identified receptors and resources according to defined assessment criteria; to develop and describe measures that will be taken to avoid, minimize, reduce or compensate for any potential adverse environmental effects; and to report the significance of the residual impacts that remain following mitigation. An Impact Assessment Methodology has been proposed here and is likely to be refined prior to being implemented for the EIA.

The types of impacts and terminology to be used in the assessment are shown in Table 3.

Table 3: Impact Assessment Terminology

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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</thead>
<tbody>
<tr>
<td>Grouping of Impact</td>
<td></td>
</tr>
<tr>
<td>Routine/Planned Impact</td>
<td>Occur as a result of expected common or regular Project activities</td>
</tr>
<tr>
<td>Cumulative Impact</td>
<td>Impacts that act together with other impacts (including those from concurrent or planned future third party activities) to affect the same resources and/or receptors as the Project.</td>
</tr>
<tr>
<td>Non-routine/Unplanned Impact</td>
<td>Occur as a result of exceptional events not expected to occur</td>
</tr>
<tr>
<td>Impact Type</td>
<td></td>
</tr>
<tr>
<td>Direct Impact</td>
<td>Impacts that result from a direct interaction between a planned project activity and the receiving environment (e.g. between occupation of a site and the pre-existing habitats or between an effluent discharge and receiving water quality).</td>
</tr>
</tbody>
</table>
**Terms of Reference – MEP Transmission Line**

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect Impact</td>
<td>Impacts that result from other activities that are encouraged to happen as a consequence of the Project (e.g. in-migration for employment placing a demand on natural resources).</td>
</tr>
<tr>
<td>Induced Impact</td>
<td>Third level impacts caused by a change in the Project environment (e.g. employment opportunities created by the increased disposable income of workers hired by the Project or its suppliers)</td>
</tr>
</tbody>
</table>

**Impact Magnitude**

<table>
<thead>
<tr>
<th>Nature</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
<td><em>Negative</em> - an impact that is considered to represent an adverse change from the baseline, or introduces a new undesirable factor</td>
</tr>
<tr>
<td>Positive</td>
<td><em>Positive</em> - an impact that is considered to represent an improvement on the baseline or introduces a positive change.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporary</td>
<td><em>Temporary</em> - impacts are predicted to be of short duration and intermittent/occasional in nature.</td>
</tr>
<tr>
<td>Short-term</td>
<td><em>Short-term</em> - impacts that are predicted to last only for a limited period (e.g. during construction) but will cease on completion of the activity, or as a result of mitigation/reinstatement measures and natural recovery (e.g. sediment suspension by capital dredging, construction workforce-local community interactions).</td>
</tr>
<tr>
<td>Long-term</td>
<td><em>Long-term</em> - impacts that will continue over an extended period, but cease when the Project stops operating. These will include impacts that may be intermittent or repeated rather than continuous if they occur over an extended time period (e.g. repeated seasonal disturbance of species as a result of maintenance dredging, operational employment).</td>
</tr>
<tr>
<td>Permanent</td>
<td><em>Permanent</em> - impacts that occur during the development of the Project and cause a permanent change in the affected receptor or resource (e.g. alteration of coastal morphology) that endures substantially beyond the Project lifetime.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scale</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local</td>
<td><em>Local</em> - impacts that affect locally important environmental and cultural or heritage resources or are restricted to a single habitat/biotope, a single (local) administrative area, a single community.</td>
</tr>
<tr>
<td>Regional</td>
<td><em>Regional</em> - impacts that affect regionally important environmental and cultural or heritage resources or are experienced at a regional scale as determined by administrative boundaries, habitat type/ecosystem.</td>
</tr>
<tr>
<td>National</td>
<td><em>National</em> - impacts that affect nationally important environmental and cultural or heritage resources affect an area that is nationally important/protected or have macro-economic consequences.</td>
</tr>
<tr>
<td>International</td>
<td><em>International</em> - impacts that affect internationally important resources such as areas protected by International Conventions.</td>
</tr>
<tr>
<td>Trans-boundary</td>
<td><em>Trans-boundary</em> - impacts that are experienced in one country as a result of activities in another.</td>
</tr>
</tbody>
</table>

| Value/Sensitivity of Receptor (for environmental) | Specific to receptors relevant to the project (see below).                                                                                                                                  |
Terms of Reference – MEP Transmission Line

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
</table>
| Ability to adapt (for social receptors) | Low (-): Affected people can easily adapt  
High (-): Affected people have difficulty adapting  
Low (+): Potential beneficiaries have difficulty adapting  
High (+): Potential beneficiaries can easily adapt |

**Impact Likelihood**

In addition to predicted impacts, those impacts that could result in the event of an accident or unplanned event (non-routine) within the Project (e.g. fuel spill, traffic accident) or in the external environment affecting the Project (e.g. flooding, earthquake) are required to be taken into account. In these cases the probability of the event occurring needs to be considered. Likelihood also needs to be taken into account when considering socio-economic factors.

| Low | The impact has not occurred in extractives industry |
| Medium | Impact has occurred in extractives projects |
| High | Impact has occurred in Botswana or southern Africa |

### 2.1 Assessing Significance

There is no statutory definition of ‘significance’ and its determination is therefore necessarily partially subjective. For the purposes of this EIA, the following definition of significance has been adopted:

> “An impact is significant if, in isolation or in combination with other impacts, it should, in the judgment of the EIA team, be taken into account in the decision-making process, including the identification of mitigation measures (by the Project) and consenting conditions (from Regulators and Stakeholders).”

Criteria for assessing the significance of impacts stem from the following key elements.

- Status of compliance with relevant Botswana legislation, policies and plans and any relevant Project or industry policies, standards or guidelines.
- The magnitude (including nature, scale and duration as described above) of the change to the natural, socioeconomic or health environment (e.g. loss of, or damage to, habitats, an increase in noise, an increase in employment opportunities), expressed, wherever practicable, in quantitative terms. The magnitude of all impacts is viewed from the perspective of those affected by taking into account the likely perceived importance as understood through consultation.
- The nature of the impact receptor (physical, biological, or human). Where the receptor is physical (e.g. a watercourse) its quality, sensitivity to change and importance are considered. Where the receptor is biological, its importance (e.g. its local, regional, national or
international importance) and its sensitivity to the impact are considered. For a human receptor, the sensitivity of the household, community or wider societal group is considered along with their ability to adapt to and manage the effects of the impact.

- The likelihood (probability) that the identified impact will occur. This is estimated based upon experience and/or evidence that such an outcome has previously occurred.

For this assessment, significance has been defined based on five levels described in Table 4 below. It is noted that positive impacts will vary in their significance from minor to major.

### Table 4: Significance Definitions

<table>
<thead>
<tr>
<th>Significance Definitions</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive impact</td>
<td>Positive impacts provide resources or receptors, most often people, with positive benefits. It is noted that concepts of equity need to be considered in assessing the overall positive nature of some impacts such as economic benefits, or opportunities for employment. Positive impacts can vary in magnitude.</td>
</tr>
<tr>
<td>Negligible impact</td>
<td>Negligible impact (or Insignificant impact) is where a resource or receptor (including people) will not be affected in any way by a particular activity or the predicted effect is deemed to be ‘negligible’ or ‘imperceptible’ or is indistinguishable from natural background variations.</td>
</tr>
<tr>
<td>Minor impact</td>
<td>An impact of minor significance is one where an effect will be experienced, but the impact magnitude is sufficiently small (with or without mitigation) and well within accepted standards, and/or the receptor is of low sensitivity/value.</td>
</tr>
<tr>
<td>Moderate impact</td>
<td>An impact of moderate significance is one within accepted limits and standards. Moderate impacts may cover a broad range, from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit. Clearly to design an activity so that its effects only just avoid breaking a law and/or cause a major impact is not best practice. The emphasis for moderate impacts is therefore on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that ‘Moderate’ impacts have to be reduced to ‘Minor’ impacts, but that moderate impacts are being managed effectively and efficiently.</td>
</tr>
<tr>
<td>Major impact</td>
<td>An impact of major significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. An aim of ESIA is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long-term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied). An example might be the visual impact of a facility. It is then the function of regulators and stakeholders to weigh such negative factors against the positive ones such as employment, in coming to a decision on the Project.</td>
</tr>
</tbody>
</table>
2.2 Residual Impacts

Clearly complete mitigation of an impact cannot always be achieved. A residual impact is the impact that is predicted to remain once mitigation measures have been designed into the intended activity. For this EIA these are the measures that have already been built into the planning and design of Project activities, together with those measures that would be expected as part of good industry practice. The significance of the residual impact will be evaluated against the criteria established for the assessment and reported in the EIA. To the extent possible, therefore, it is the significance of the residual impacts that will be reported in this EIA. The residual impacts will be described in terms of their significance in accordance with the categories identified above.

There is an iterative element to this process, so residual impacts initially judged to be ‘major’ or ‘moderate’, even with the application of mitigation measures, will receive ongoing management attention including further sequences of prediction, evaluation and additional mitigation measures being identified.

2.3 Cumulative Impacts

Cumulative effects are caused by the accumulation and interaction of multiple stresses affecting the parts and the functions of ecosystems. Of particular concern is the knowledge that ecological systems sometimes change abruptly and unexpectedly in response to apparently small incremental stresses. For purposes of this report, cumulative impacts have been defined as “the changes to the environment caused by an activity in combination with other past, present, and reasonably foreseeable human activities”.

Where cumulative impacts are expected to be significant, these will be assessed and discussed in the EIA.

2.4 Dealing with Uncertainty

Even with a final design and an unchanging environment, impacts are difficult to predict with certainty. Potential impacts may be assessed using tools ranging from quantitative techniques such as hydrodynamic modeling to qualitative techniques based on expert judgment and historical information. The accuracy of these assessment tools depends on the quality of the input data and available information. Where assumptions have been made, the nature of any uncertainties associated with the assumption will be discussed. For qualitative predictions / assessment some uncertainty is removed through consultation.

In projects such as the MEP where the design process is in progress, uncertainty stemming from ongoing development of the project design is inevitable. When such uncertainties are material to EIA findings, they will be clearly stated and will be approached conservatively (‘the precautionary approach’) in order to identify the broadest range of likely residual impacts and necessary mitigation measures.
3  RELEVANT LEGISLATION

3.1 Botswana Administrative Framework

The executive power of Botswana is vested in the President. He exercises the powers either directly or through other officers subordinate to him. Each Ministry has the responsibility to coordinate development and operational activities in their particular spheres, to formulate, direct and coordinate the overall national policies and strategies in terms of their respective portfolios, and to ensure the implementation thereof through the various Government Departments established for such purposes.

The following Ministries and related Departments were identified as having bearing on the MEP and are being consulted during the EIA process:

- Ministry of Environment, Wildlife and Tourism
  - Department of Environmental Affairs (DEA)
  - Department of Waste Management and Pollution Control (DWMPC)
  - Department of Meteorological Services (DMS)

- Ministry of Minerals, Energy and Water Resources
  - Department of Mines (DM)
  - Department of Water Affairs (DWA)
  - Department of Geological Survey (DGS)
  - Energy Affairs Division (EAD)

- Ministry of Lands and Housing
  - Department of Lands (DL)
  - Department of Town and Regional Planning (DTRP)

- Ministry of Health
  - Department of AIDS Prevention and Care
  - Department of Clinical Services
  - Department of Public Health

- Ministry of Labour and Home Affairs
  - Department of Labour and Social Security (DLSS)
  - Department of National Museums, Monuments and Art Gallery (DNMMAG)

- Ministry of Local Government
  - Department of Social Services (DSS)
  - Department of District Administration (DDA)
  - Department of Tribal Administration (DTA)
  - Department of Local Government and Development (DLGD)

- Ministry of Works and Transport
  - Department of Roads (DR)
  - Department of Road Transport and Safety (DRTS)

- Ministry of Agriculture
  - Department of Agricultural Planning and Statistics
Administratively, Botswana is divided into ten districts; the Central District, Ghanzi, Kgalagadi, Kgatleng, Kweneng, North-west, North-east, Chobe, South-east and the Southern District, as well as five town councils; namely Jwaneng, Selebi-Pikwe, Lobatse, Francistown and Gaborone.

Central Government is represented in the districts by the office of the District Commissioner and assisted by district councillors and development committees. In turn District Councils are represented by Local Authorities consisting of urban and rural local government bodies such as district and town councils. Administrative decentralisation furthermore involves the district and tribal administration centres, including field offices/agencies of government ministries, as well as sub-districts and subordinate land boards.

At the village level, chiefs and headmen collectively form the Tribal Administration, supported by Village Development Committee (VDC), the police service and customary courts. Traditional leaders (dikgosi) fall under the jurisdiction of district commissioners but exercise their authority through the kgotla (customary court and/or village council), which they also preside over. Sub-chiefs and headmen represent the senior chiefs in their specific villages or wards. They are responsible for upholding Tswana custom and traditions, while they are expected to assume a leading role in the planning and implementation of local development programmes.

The Mmamabula Energy Project is located in the Mahalapye Sub-District of the Central District of Botswana. Villages potentially affected by the proposed transmission lines are Mmaphashalala, Mookane, Bonwapitse, Dibete, Mosomane, Dinokwe, Mahalapye, Lose, Tewane, Radisele, Palapye, Dikabeya and Tamasane.

### 3.2 Legal Requirements

Botswana has seen significant changes to the environmental legislative and administrative frameworks within the last few years culminating in the promulgation of the Environmental Impact Assessment Act 6 of 2005 and the creation of the Ministry of Environment, Wildlife and Tourism (MEWT) with a mandate to coordinate environmental conservation and protection. The Department of Environmental Affairs (DEA) is mandated to implement the Environmental Impact Assessment Act which requires an Environmental Impact Assessment (EIA) to be completed for the project area and the approval of an Environmental Impact Statement (EIS).

The Monuments and Relics Act (Chapter 59:03) is administered by the Department of National Museums, Monuments and Art Gallery (DNMMAG) and requires the completion of an Archaeological Impact Assessment (AIA). The Archaeological Impact Assessment Report must be submitted to the DNMMAG for endorsement before it may be included as a sub-component of the EIA report for submission to the DEA.

In addition to the EIA authorisations listed above several additional permits and licences may be required from several Botswana Government Departments for the successful implementation of the Mmamabula Energy Project. These are listed in Table 5 below:
Table 5: Botswana Government Departments

<table>
<thead>
<tr>
<th>MAIN AUTHORISATIONS</th>
<th>LEGISLATIVE PROVISION</th>
<th>GOVERNMENT DEPARTMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Archaeological Impact Assessment (AIA) and permits for the disturbance of archaeological sites</td>
<td>Monuments and Relics, Chapter 59:03</td>
<td>Department of National, Museums, Monuments and Art Gallery (DNMMAG) Commissioner of Monuments and Relics</td>
</tr>
<tr>
<td>Electricity Generation and Supply Licence</td>
<td>Electricity Supply, Chapter 73:01</td>
<td>Ministry of Minerals, Energy &amp; Water Affairs Energy Affairs Division (EAD)</td>
</tr>
<tr>
<td>Surface Rights Lease Agreements</td>
<td>Tribal Land, Chapter 32:02</td>
<td>Ngwato Land Board &amp; Mahalapye Subordinate Land Board Department of Lands (DL)</td>
</tr>
<tr>
<td>Acquisition of private land (MEP area)</td>
<td>Negotiations, willing seller willing buyer or expropriation in terms of the Acquisition of Property, Chapter 40:05</td>
<td></td>
</tr>
<tr>
<td>Acquisition of land or rights over land, necessary for the purpose associated with the generation or supply of electricity by a licensee</td>
<td>Electricity Supply, Chapter 73:01 Acquisition of Property, Chapter 40:05</td>
<td>Ministry of Minerals, Energy &amp; Water Resources Energy Affairs Division (EAD)</td>
</tr>
</tbody>
</table>
### Terms of Reference – MEP Transmission Line

<table>
<thead>
<tr>
<th>MAIN AUTHORISATIONS</th>
<th>LEGISLATIVE PROVISION</th>
<th>GOVERNMENT DEPARTMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning Approvals for all transmission line infrastructure</td>
<td>Town and Country Planning, Chapter 32:09</td>
<td>Local Council, Central District Council &amp; Mahalaype sub-council</td>
</tr>
<tr>
<td>Road Construction Permits for Roads, Culverts and T-junctions</td>
<td>Road Traffic, Chapter 69:01</td>
<td>Principal Road Engineer, Department of Roads (DR)</td>
</tr>
<tr>
<td>Transportation permits for Bulk Carriers and Abnormal Loads</td>
<td>Road Transport (Permits) Chapter 69:03</td>
<td>Department of Road Transport and Safety (DRTS)</td>
</tr>
</tbody>
</table>
4 BACKGROUND

4.1 Study Area

The area of interest is located in the south east region of Botswana, Southern Africa. Please refer to Plan 1 for the regional setting.

The proposed transmission lines will run in a northerly direction from the power plant to the Moropule sub-station at Palapye and then in a north easterly direction to the Phokoje sub-station near Selebi-Pikwe. The lines will also go in a south westerly direction to the Mosaditshweni sub-station, north of Gaborone (Plan 2). Between Moropule and Mosaditshweni two route alternatives are under consideration. The first alternative (western route) runs alongside the existing transmission lines, adjacent to the A1 highway, while the second alternative (eastern route) is a more direct line but traverses less disturbed regions. In addition there will be four 400kV lines from the power plant to South Africa, which will run either through the area of the mineral rights boundary or just south east of this. Four route alternatives will be considered, with a split off one of the routes to form a fifth Limpopo River crossing. In the case of these four lines, a maximum of two lines will traverse a single corridor and these corridors need to be separated by a minimum of 2 km in order to reduce the risk of a supply failure.

There is some existing infrastructure along these proposed routes. The A1 national road runs north easterly from Gaborone to Serule. The North-South Carrier, which is the bulk water supply pipeline, runs from Gaborone to Selebi-Pikwe. Other transmission lines currently run parallel to the A1 from just north of Gaborone to just north of Palapye. The proposed western alignment would run adjacent to these existing servitudes.

The description of the physical and social environment is presented in the section “Baseline Environmental Information”.

4.2 Project Description

The rich coal reserves of the Mmamabula coalfield in Botswana are a major natural resource and contain in excess of three billion tonnes of relatively high quality thermal coal. Mmamabula is an extension of the Waterberg Coalfield in South Africa, which is host to South Africa’s largest coal mine, Grootegeluk, and Eskom’s associated 3 600MW power plant. The proposed power plant site is approximately 80 kilometres west of Matimba power station in South Africa. The site is in close proximity to servitudes providing road, rail and power.

Studies have shown that the optimum way of integrating this power station into the Southern African power grid is to assume that other similar projects will be developed in the region in the near future. Based on this assumption a solution has been designed which will at the very least accommodate the Mmamabula project as well as Project Alpha (developed by Eskom in South Africa).
The proposed transmission lines will be approximately 360 km in total length. The following lengths are the approximations which will make up the total proposed transmission line project:

- Mmamabula to Moropule: 160 km
- Moropule to Phokoje: 105 km
- Mmamabula to Mosaditshweni: 80 km
- Mmamabula to SA border (x4): 25 km

The transmission lines will carry 400 kV of power. Botswana’s electricity requirements will be met by reduction of the 400kV to 220 kV at the substations within Botswana. The remaining power generated will be exported to South Africa via 400kV lines. The proposed pylon design will be a guyed “V”, fixed to the ground by two guys. The approximate height of these will be 21 750 to 30 750 mm. Three conductors, carrying the electricity, will be suspended from one pylon to the next.

### 4.3 Project Motivation

#### 4.3.1 Energy Deficiency

The Southern African Development Community (SADC) region is expected to experience significant electricity shortages in the coming years and major new base load power generation projects will be required from around 2011. Major new industrial and metallurgical projects could be put on hold pending security of tenure of electricity supply. The Mmamabula Energy Project (MEP) is well placed to help meet these requirements and is thus being pursued at an accelerated rate to complete the EIA process in time to meet the 2011 commercialisation date for Phase1. The construction of the transmission lines are a critical component of this project as they are essential to transmit the generated electricity away from the power station. This report refers to the transmission lines within Botswana, which includes the links from the MEP to the South African border i.e. the Limpopo River, which will eventually form part of this project. The development of the MEP would, therefore, provide a new and important source of power, specifically for Botswana and South Africa. The principal power withdrawal is expected to be through Eskom, South Africa’s national utility, which is one of the largest and most efficient power utilities in the world.

Energy plays a pivotal role in economic growth and improving livelihoods. Although an increased supply of energy does not automatically guarantee an acceleration of human development, it is a prerequisite. Some form of energy is essential for the production and preservation of food, for sanitation, for acceptable standards of living and for all constructive activity. Finding effective means of providing safe, affordable and reliable energy services is therefore of critical importance to governments and organisations endeavouring to promote sustainable development.
Botswana’s rapid economic growth, which began in the 1970’s, continues to date. Much of this growth can be attributed to the country’s successful program of mineral exploration and development. Botswana has one of the most stable economies in Africa for investment by mining companies. Known mostly for its successful diamond industry, the country is still dependent on South Africa for providing up to 70% of its electricity needs. Botswana hosts large resources of high ash medium calorific coal, which were delineated in the early 1980’s.

There is an urgent need to address the energy deficit problem in Botswana and to provide an affordable solution at a minimum cost to the environment. The National Energy Policy aims at providing a least cost mix of energy supply, which reflects total life cycle costs and externalities, such as environmental damage. The energy policy objectives are mainly that:

- energy users should have access to appropriate and affordable energy services;
- energy should be used efficiently;
- the energy supply industry should be economically sustainable and efficient;
- all users should have security in their access to energy;
- energy extraction, production, transport and use should not damage the environment or people’s health and safety.

In the long term sustainable energy usage needs to be implemented.

### 4.3.2 Project Benefits

The Mmamabula Energy Project (MEP) will benefit Botswana in many ways. The main benefit will be the stability of the power network, with the option to sell electricity to neighbouring countries. The implementation of the proposed transmission lines will enable the MEP to become a working reality. Significant employment opportunities will be created by the MEP with an additional benefit of community upliftment. The Project can promote sustainable local economic development in the surrounding areas, which are currently remote from existing development nodes. The resulting economic multiplier effect will ensure that new businesses are created and the wage economy in the area is substantially enhanced.

As suggested by the Botswana Power Corporation (BPC), some of the comparative advantages of Botswana as a host of the next thermal power station include the following:

- It will encourage political stability and high sovereign rating;
- Availability of vast coal resources which are unexploited;
- Botswana currently has relatively low emission loading;
• Proximity of Mmamabula to the South African transmission network and thus an avenue for export;

• Botswana’s transmission network is well connected to countries in the North and South;

• Botswana currently has low tax rates.

There are, therefore, many benefits to be gained from the MEP on both a national and regional level.

4.4 Phases of Development

The phases of development and their expected timeframes are detailed below in two tables (Table 6 and Table 7). The project is currently in the development phase, where studies are being conducted and permission to continue will need to be sought. The next phase is the implementation phase, where the project commences with construction. Expected timeframes for both phases are given below.

**Table 6: Phases of transmission development and expected timeframes – Development Phase**

<table>
<thead>
<tr>
<th>Project Development Phase</th>
<th>Responsible Party</th>
<th>Expected Completion Date</th>
<th>Relevant Authority/Stakeholder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completion of the EIA</td>
<td>DWA and subcontractors</td>
<td>Early 2007</td>
<td>Department of Environmental Affairs in Botswana</td>
</tr>
<tr>
<td>Completion of the international ESIA</td>
<td>ERM and subcontractors</td>
<td>Mid 2007</td>
<td>Potential lenders for the project as well as interested and affected parties</td>
</tr>
</tbody>
</table>
Table 7: Phases of development and expected timeframes – Implementation Phase

<table>
<thead>
<tr>
<th>Project Implementation Phase</th>
<th>Expected Commencement Date</th>
<th>Expected Completion Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>Late 2007 / early 2008</td>
<td>2011</td>
</tr>
<tr>
<td>Operation</td>
<td>From 2011</td>
<td>2050</td>
</tr>
<tr>
<td>Decommissioning</td>
<td>indefinite</td>
<td></td>
</tr>
</tbody>
</table>
5 PROJECT ALTERNATIVES

Several alternatives have been investigated for the project and these will be detailed in the EIS. The alternatives that have been considered are listed below, however the project is still in the development stages and there is potential for further alternatives to develop in the forthcoming months. Table 8 below summarises some of the alternatives that will be investigated and detailed in the EIS.

Table 8: Alternatives under consideration

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Alternatives being Investigated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Use Alternatives</td>
<td>Using land for grazing and cultivation</td>
</tr>
<tr>
<td></td>
<td>Using land for development</td>
</tr>
<tr>
<td>Infrastructure Alternatives</td>
<td>North-south route selection for infrastructure</td>
</tr>
<tr>
<td></td>
<td>Alternative pylon/tower design</td>
</tr>
<tr>
<td></td>
<td>Corridors to South Africa</td>
</tr>
<tr>
<td>Power Generation</td>
<td>Importing power from South Africa</td>
</tr>
<tr>
<td></td>
<td>Renewable sources of energy</td>
</tr>
</tbody>
</table>

The environmental consultants involved with the MEP have been involved in the project planning and development. This has enabled environmental considerations to be incorporated into the project objectives, constraints and design, ensuring the project meets environmental standards.
6 PURPOSE AND OBJECTIVES OF THE EIA

6.1 EIA Objectives

The objectives of the transmission line EIA are to:

• Provide a single complete document which will satisfy the approval of relevant authorities;

• Identify and meet all legislative requirements;

• Give motivation for and benefits of the proposed activity;

• Provide information on the environmental factors and constraints considered in the project options;

• Describe the biophysical, cultural and social environmental baseline conditions of the pre-development environment;

• Identify and quantify the impact the transmission line activities will have on the biophysical, cultural and social environment;

• Identify mitigation methods available to minimise the potential of adverse environmental impacts;

• Identify methods to maximise the positive impacts arising from the transmission line;

• Examine the environmental effects of any alternative routes or construction methods considered;

• Identify constraints associated with the mitigation methods recommended, and allow provision for modification;

• Identify the residual environmental impacts expected to arise and evaluate their impact on the environment;

• Consult with Interested and Affected Parties (I&APs) throughout the EIA process and to keep them informed of proposed activities;

• Afford the I&APs the opportunity to voice their concerns regarding the proposed project;

• Consult with relevant government officials regarding the issues relating to the proposed project;
• Provide information on the consideration of alternative routes to avoid and minimise the potential of adverse environmental and social impacts; and

• Design an environmental monitoring programme which will ensure the effective implementation of recommended environmental controls and mitigation measures.

6.2 Environmental Objectives for the Project
The environmental objectives for the construction, operational, and decommissioning phases of the transmission line are to:

• Protect the biophysical environment from any impacts that cannot be mitigated and that will negatively impact on biodiversity on a regional scale;

• Ensure minimal impacts on the water resources in the area;

• Ensure that activities are carried out so as to aid rehabilitation; and

• Ensure a safe environment for people to live in as stipulated in the constitution.

6.3 Socio-Economic Objectives for the Project
The socio-economic objectives of the construction, operation, and decommissioning phases of the transmission line are to:

• Adhere to an open and transparent communication procedure with stakeholders at all times;

• Ensure that accurate and regular information is communicated to I&APs;

• Ensure that information is communicated in a manner which is understandable and accessible to I&APs;

• Enhance project benefits and minimise negative impacts through intensive consultation with stakeholders;

• Assemble adequate, accurate, appropriate, and relevant socio-economic information relating to the context of the operation;

• Detail recruitment strategies for the transmission line that prioritise the sourcing of local labour, and share in gender equality;

• Ensure an atmosphere of equality and non-discrimination among the workforce;

• Adhere to principles of international best practice in all socio-economic activities.
6.4 Archaeological and Cultural Objectives for the Project

Sites of historical and cultural significance will have to be relocated, recorded or protected before the construction of the transmission line. The objectives to be met are:

- To instil a sense of value in the local inhabitants for the relevant artefacts and structures by the treatment afforded to them;

- To deal with I&APs in a sensitive manner with regard to the relocation of graves and the destruction of farm infrastructure;

- To ensure that relocation is done in such a way to retain the relevant context of the artefacts and structures;

- To compile an inventory and description of resources found;

- Assess the positive and/or negative impacts of the project relative to the culture and heritage of the area.

- Make recommendations for alternatives or mitigation to reduce negative impacts such as remove, record or preserve.

- To encourage the preservation of cultural structures not affected by the transmission line.
7 SCOPE OF THE EIA

This section describes the scope of work that will be investigated for the EIA, the proposed contents of the Environmental Impact Statement (EIS) and the terms of reference that the specialist studies will be carried out in accordance with.

7.1 Proposed Structure of EIS

<p>| | |</p>
<table>
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<tr>
<th></th>
<th></th>
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</thead>
<tbody>
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<td>INTRODUCTION</td>
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<td>2</td>
<td>METHODOLOGY AND TERMS OF REFERENCE</td>
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<td>3</td>
<td>LEGAL REQUIREMENTS</td>
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<td>3.1</td>
<td>Administrative Framework</td>
</tr>
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<td>3.2</td>
<td>Central Government Policy Development</td>
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<td>3.3</td>
<td>International Conventions and Protocols</td>
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<td>3.4</td>
<td>Legislative Framework</td>
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<tr>
<td>4</td>
<td>PROJECT APPLICANT DETAILS</td>
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<td>5</td>
<td>REGIONAL SETTING</td>
</tr>
<tr>
<td>5.1</td>
<td>Regional Location</td>
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<td>5.2</td>
<td>Existing Surface Infrastructure and Servitudes</td>
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<td>5.3</td>
<td>Land Tenure</td>
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<tr>
<td>6</td>
<td>BRIEF PROJECT DESCRIPTION</td>
</tr>
<tr>
<td>6.1</td>
<td>The Mmamabula Energy Project</td>
</tr>
<tr>
<td>6.2</td>
<td>Transmission Line</td>
</tr>
<tr>
<td>7</td>
<td>PROJECT MOTIVATION</td>
</tr>
<tr>
<td>7.1</td>
<td>Project Benefits</td>
</tr>
</tbody>
</table>
7.2 Intended Product Market
7.3 Estimated Financial Costs

8 PROJECT ALTERNATIVES
8.1 Alternative Transmission Line Routes
8.2 No Project Alternative

9 DESCRIPTION OF THE CURRENT ENVIRONMENT
9.1 Physical Features and Characteristics
9.2 Biological Features and Characteristics
9.3 Cultural Characteristics
9.4 Socio-Economic Characteristics

10 PUBLIC PARTICIPATION PROCESS
10.1 Notification & Dissemination of Information
10.2 Process of Engagement
10.3 Results of Meeting
10.4 Identified Interested and Affected Parties

11 DETAILED DESCRIPTION OF THE PROPOSED PROJECT
11.1 Surface Infrastructure
11.2 Construction Phase
11.3 Operation Phase
11.4 Decommissioning Phase

12 ENVIRONMENTAL IMPACT ASSESSMENT
12.1 Project Related Impacts
12.2 Trans-Boundary Impacts
12.3 Cumulative Impacts
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>ENVIRONMENTAL MANAGEMENT PLAN</td>
</tr>
<tr>
<td>13.1</td>
<td>Construction Phase</td>
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7.2 Physical Features and Characteristics

7.2.1 Climate
The regional and local climate will be investigated. Rainfall, wind direction and speed, and temperature will be investigated. Average evaporation and precipitation will be utilised to design the most sustainable vegetation cover during the rehabilitation of certain disturbed areas.

7.2.2 Topography
Topographical maps will be sourced from the Botswana Government.
The scope includes determining the average elevation above sea level of the landscape, the location of surrounding mountain range, the extent of river systems and the location of water bodies.

7.2.3 Geology
No geological studies will be carried out as it is deemed unnecessary. The geology will have no bearing on the transmission line and the construction and / or operation of the transmission line will have no impact on the geology of the region. Geotechnical investigations will, however, have to be undertaken before erecting the transmission towers.

7.2.4 Surface Water
The surface water assessment will involve investigating aspects that will either have an affect on the construction and / or operation of the transmission line or will be impacted on by the construction and / or operation of the transmission line. The following aspects are pertinent to this project:

- Flood lines
The 1:100 year flood lines will be calculated. These will be used to determine where the pylons should be placed where the transmission line intercepts the rivers, streams and pans. A 2m contour map will be used to calculate these flood lines and to assess the catchment area.

- Wetlands
The presence of wetlands will be assessed. This assessment will be done in conjunction with the wetland assessment discussed in the fauna and flora section, but the emphasis will be on water quality and water quantity.

- Surface water quality
The surface water bodies, which include rivers, streams and pans, will be analysed in order to establish the current water qualities. Typical analyses will include metals with relevant heavy
metals, nutrients, TDS, conductivity, salts, alkalinity and pH. These results will provide a baseline set of data which will be used as a benchmark. This will allow for comparisons to be made during and after the construction of the transmission lines, especially in the case of suspected contamination during the construction activities.

### 7.2.5 Groundwater

No groundwater field studies will be carried out as it is deemed unnecessary. The groundwater system will have no bearing on the transmission line and there is no anticipated impact on the groundwater system during construction and/or operation of the transmission. A desktop study will, however, be undertaken, using existing groundwater data for the area, to contribute to the understanding of the receiving environment in general.

### 7.2.6 Air Quality

The operation of the transmission lines should not have any impact on the air quality of the region and it will not be necessary to conduct ongoing monitoring along the length of the development. Construction activities, including clearing of vegetation and vehicle movement will however, have the potential for dust generation. As this will take the form of relatively large airborne particulates, the most appropriate dust monitoring would be dust fallout. A baseline dust fallout assessment will be, therefore, be conducted during the EIA. Apart from the temporary, minor impact from engines of the additional vehicles during construction, there are no combustion processes associated with the transmission lines and baseline PM2.5, SO\(_x\) and NO\(_x\) will thus not be established. Measurements taken for proposed power station will, however, be fairly indicative of most of the region.

### 7.2.7 Noise

The aim of this study is to describe the present environment in which the development will take place and identify the possible key risks involved.

The focus of this noise study is the following:

- To identify the noise sensitive receptors that will be affected by the construction and operation of the transmission line.
- To estimate the present ambient noise levels at the identified noise sensitive receptors,
- To identify the key issues that will influence the possible noise impact that the construction and operation of the transmission line will have.

A site visit was conducted to familiarise the consultant with the typical environment of the area through which the transmission line will be constructed.
Sampling measurements have been initiated as part of the Mmamabula Energy Project baseline study. The results of these measurements are assumed to be representative of the noise sensitive areas that will be affected by the construction and operation of the transmission line.

7.2.8 Soil

Existing soil maps will be obtained from the relevant government departments. The soils along the proposed routes will be assessed and related to land use practices and vegetation types. Due to the nature of this project, i.e. the construction and operation of the proposed transmission lines, there will not be a severe impact on soils along the route and no in depth soil survey is necessary.

7.2.9 Land Capability

Land capability will be assessed according to the soils identified and their physical and chemical characteristics in relation to other known variables such as climate, topography, aspect and altitude. This information will be sourced from maps, presenting soil types and land capability provided by the Botswana government as well as from a cursory field assessment. The classification will be according to the South African Chamber of Mines Land Capability Categories, unless otherwise instructed.

7.2.10 Land Use

Land use will be assessed using available images and information gathered during the field surveys. Maps will be sourced from the relevant government departments in Botswana.

7.3 Biological Features and Characteristics

7.3.1 Flora and Fauna

The scope of work for the impact assessment will focus on the protection of natural habitats and the management of renewable biological resources. It is assumed that the protection and management of these habitats and resources will in effect be preserving the biodiversity of the area.

The results of this investigation will be interpreted together with the other specialist studies when compiling the EIS. In terms of sustainable management and preservation of natural habitats and biological resources, the findings of the social impact assessment (SIA) and public participation process (PPP) will be critical in determining the pressures and importance placed on the surrounding fauna and flora by the local population. What effect disturbance to the immediate surroundings will have on the ecological diversity of the greater region will also be assessed. From the results of the specialist studies, a monitoring programme will be developed that will be incorporated into the EMP.

Project Aspects Included in the Scope of Work
• The presence of different species of vegetation, particularly those of importance (Red Data and medicinal plants for example).

• The presence of different species of fauna, particularly those of importance (Red Data threatened species, for example).

• The presence of different habitats (habitat diversity).

• The inter-relationship between the habitats identified on the routes and those in the surrounding area, and the dependency of certain species (both fauna and flora) on this relationship.

Approach and Methodology

• Background Research

Planning prior to going out to the field is essential. Existing plans and maps will be used to gain an understanding of the site and to get an idea of what to expect once on site. Sites of importance, such as wetland areas and rivers, can often be determined from these and then investigated in detail during the field work. Discussions with members of other disciplines will be initiated so as to ensure the integration of knowledge.

• Physical study and report compilation

This project requires both a wet season and a dry season fauna and flora survey to be conducted. A detailed field assessment of all natural habitats occurring along the routes will be conducted. It will be determined if there is any conservation status assigned to any of the areas traversed by the proposed routes of the transmission line. Plant and animal species protected by Botswana legislation will similarly be established. Satellite images and aerial photographs will be used to compliment the field work and assist in delineating vegetation types and identifying any possible sensitive vegetation units.

• Floristic survey

The primary objective is to characterise the vegetation in the study area by conducting an in-depth vegetation survey. Plant species present on the site will be identified and listed. This will be done through a detailed analysis of many sample plots, identifying all plant species in each sample plot. The relative abundance of each species will also be recorded. The presence of the following plants will be established:

  o Those with Red Data status (individual co-ordinates should be taken);

  o Those with medicinal uses;

  o Those with cultural uses;
Those that are declared weeds and invader species.

This will allow for the classification of the different vegetation units (habitats) present. Species composition and habitat diversity will be assessed. The homogenous units identified will be assessed for the presence of the above-mentioned plants. The identification of these units will lead to the recognition of potentially important habitat types for discussion in the faunal survey. Wetland areas, including all pans, streams and rivers will be noted and assessed in detail, where required.

The Braun-Blanquet sampling method will be used for the vegetation survey. It is a standardised method used for vegetation classification in South Africa whereby all plants within a sample plot of approximately 30 x 30 m are recorded. A cover abundance value is then estimated for each of the identified species according to the Braun-Blanquet scale.

The habitat will be evaluated in terms of the topography (crest, midslope, foot slope, plain, river and plateau), aspect (north, south, east and west), slope (in degrees), altitude and geomorphology (convex, concave or flat). GPS coordinates for each of the sample plots will also be recorded.

Data will then be imported into TURBOVEG (Hannekens, 1996b) and a list of all species recorded, as well as the sample plot number in which each species was found, is compiled and exported to MEGATAB (Hannekens, 1996a) for vegetation classification. The vegetation is then classified into plant communities following TWINSPAN procedure and then described according to cover abundance, diagnostic species, dominant species and species composition. Vegetation types, as opposed to plant species, will provide a good indication of faunal biodiversity because most animals, birds, insects and other organisms are associated with particular vegetation types.

The impacts of the construction and operation of the transmission line on the vegetation will be investigated and discussed. This will include the impacts on the presence of certain important species as well as the impacts on habitat diversity. The influence on the ecosystems in the area and their interactions will be assessed and discussed.

Faunal survey

The presence of mammals, birds, reptiles and terrestrial invertebrates will be investigated, with particular emphasis on those with Red Data threatened status. The presence of these species will be related to the vegetation units (habitats) identified during the floral survey. The influence of habitat diversity on species composition will be investigated. This survey will assess the potential Red Data habitats and indicate the likelihood that Red Data species actually occur in these habitats.

All sample plots are traversed on foot to record as many species as possible. Actual sightings, spoor, calls and nesting sites are used to establish the presence of animals.

Invertebrates are sampled using a sweep net of 350 mm diameter. At each sample plot 150 sweeps are conducted. Insects are collected from the net using a pooter, placed into a jar filled
with 40% ethanol, and brought back for identification. For each sample plot the insects are identified to at least family level and where possible to genus and species level.

The impacts of the construction and operation of the transmission line on the animal life will be investigated and discussed. This will include the impacts on the presence of certain important species as well as the impacts relating to habitat diversity. The influence on the animal life in the ecosystems and their interactions will be assessed and discussed.

- **Wetland Survey**

A baseline investigation involving a desktop assessment and limited ground truthing will be undertaken covering the proposed routes. The accuracy of the assessment will be determined by the quality and scale of the available imagery.

At this point only the location of wetlands will be noted and surface water quality samples will be analysed, as part of the surface water scope of work. If required, a more detailed wetland survey can be undertaken. The general integrity of the aquatic environment can be characterised according to certain ecological indicators, selected to represent each of the responding habitat and stressor components involved in the aquatic environment. These could include:

- **Stressor Indicators:**
  - In situ water quality

- **Habitat Indicators:**
  - General habitat Assessment

- **Response Indicators:**
  - Vegetation (aquatic, riparian and littoral)
  - Birds, mammals and herpetofauna.

**EIA / EMP**

The results of this investigation will be interpreted in conjunction with the other specialist studies when compiling the EIA and EMP. In terms of sustainable management and preservation of natural habitats and biological resources, the findings of the social impact assessment (SIA) and public participation process (PPP) will be critical in determining the pressures and importance placed on the surrounding fauna and flora by the local population. What effect disturbance to the immediate surroundings will have on the ecological diversity of the greater region will also be assessed. From the results of the specialist studies, a monitoring programme will be developed that will be incorporated into the EMP. The biophysical study will also enable recommendations
to be made on the final rehabilitation of the area as well as operational policies to ensure this rehabilitation is possible.

**Report Writing**

This step will involve the collation of all information gathered during the desktop and field surveys. The report should include at least the following information:

- Legislation, policies, standards, and criteria relating to the topic;
- Field assessment methodology;
- Baseline fauna and flora information;
- Impact assessment based on the proposed project (quantify impacts and cumulative impacts);
- Proposed mitigation and management measures;
- Environmental objectives and goals, including a gap analysis;
- Recommended monitoring programme for fauna and flora;
- Plans, maps (1:50 000), and figures throughout.

The report will be written in accordance with structures approved in Botswana legislation.

### 7.3.2 Avifauna

One of the most severe impacts on the biophysical environment associated with transmission lines is bird fatalities. Therefore, due to the nature of this proposed project a detailed bird impact study is recommended. The objective of this study is to gain an understanding of what species, and populations of species, could potentially be impacted on by the proposed transmission lines. This will entail:

- The identification of potential bird habitat (especially micro-habitat) through physical investigation of the proposed routes;
- The identification of all sites of importance, such as roosting and nesting sites, and stream interception points;
- The identification of collision hotspots, which will be identified and marked;
- The investigation of migratory patterns which will lead to an understanding of the possible impact of the transmission lines on migratory bird patterns;
The identification, description and evaluation of the potential impacts on transmission line sensitive large terrestrial birds in the area, with specific emphasis on Red Data species;

The discussion of typical impacts arising from transmission lines, such as electrocutions, collisions and habitat destruction, with specific reference to this proposed transmission line;

The identification of fatal flaws in the project (if any); and

The discussion of site specific mitigation measures which will reduce the potential negative impacts identified.

7.3.3 Sensitive Areas

The presence of sensitive areas will be assessed through the investigations involved with the fauna and flora, avifauna, archaeological and social studies.

7.4 Cultural and Socio-Economic Features and Characteristics

7.4.1 Sites of Archaeological and Cultural Significance

The scope of work will involve the following aspects:

• Step 1: Archival research

This phase has been completed and involved the determination of the historical and pre-historical status of the area through archival research. Research involved a desktop study of existing data from the area, including data stored in the National Museum. Desktop information has been provided relating to archaeological sites, historical sites, graves, architecture, oral history and anthropological elements. The desktop study will also examine aerial photographs (once available) to identify possible locations where archaeological sites may be located, and gain an indication of other structures present in the area.

• Step 2: Physical study

During this physical study, key stakeholder consultation will be undertaken in an effort to unveil further information relating to oral history, and the locality and significance of graves, cemeteries, and monuments. Stakeholder consultation will be conducted in such as manner so as to ensure that incorrect or incomplete information is not transferred through communities. The physical study will also serve to identify topographical areas of possible historic and prehistoric activity. Areas of sensitivity will also be described and mapped. All areas containing significant sites and structures of cultural and archaeological interest will be plotted onto maps and their GPS coordinates recorded.

• Step 3: Report writing
This step will involve the collation of all information gathered in Steps 1 and 2. The report that is generated will be called an “Archaeological and Heritage Impact Assessment” (A&HIA) and will conform to the structure required by the Department of Museums. It will include at least the following information:

- Legislation, policies, standards, and criteria;
- Assessment methodology;
- Historical review;
- Heritage sites baseline;
- Impact assessment (quantify impacts);
- Proposed mitigation and strategy analysis;
- Impacts summary; and
- Plans, maps, and figures throughout.

The impacts of the proposed project on potential Archaeological or Heritage aspects will be taken into consideration and discussed and evaluated according to the following:

- Extent and spatial scale
- Intensity and severity
- Magnitude and significance
- Legislation

**Approach and Methodology**

The archaeological resource overview is intended to identify and assess archaeological resource potential or sensitivity within a proposed study area. Recommendations concerning the appropriate methodology and scope of work for subsequent inventory and/or impact assessment studies are also expected.

For a project of this nature an overview study entails:

- a background library and records search of ethnographic, archaeological and historical documents pertinent to the study area;
- a statement of archaeological resource potential and distribution in the study area;
• a preliminary assessment of anticipated impacts in light of proposed development plans; and

• recommendations concerning the need for further archaeological impact assessment studies.

These studies are of fundamental importance in assessing the archaeological resource potential of a study area, and should result in predictions regarding archaeological site variability, density and distribution. In addition, it may also be possible to develop a preliminary evaluatory framework within which to judge the significance of archaeological sites. Depending on the availability and quality of existing data, it may be possible to achieve these research objectives without undertaking a field survey; however, documentary research and, where practical, direct consultation with knowledgeable persons and organizations is essential.

Overview studies are particularly important with respect to large-scale development projects such as mines, pipelines and transmission lines.

Documentary Research: this aspect of the overview study will involve a thorough review of library and archival literature as well as other relevant data sources. The research will include, but should not be limited to:

• a check of extant records including the Museum Archaeological Site Inventory, legal land survey records, and other pertinent records and inventory files;

• a review of all previous archaeological investigations in the study area or in immediately adjacent areas;

• a review of relevant information from published and unpublished sources such as local and regional history, prehistory and ethnography;

• a review of relevant paleoecological studies to assess past environmental conditions that may have influenced cultural adaptations; and

• examination and interpretation of air photographs and geomorphological and pedological information as an aid for assessing the potential for human habitation.

Direct Consultation: Individuals and organizations with knowledge of archaeological resources in the study area will be contacted where appropriate. The objective will be to compile information concerning the location, distribution and significance of reported archaeological sites. Among those who should be consulted are: local museums, archaeological or historical societies, residents in the area and specialists having local or regional expertise. Specialists may include archaeologists, historians and ethnohistorians, among others.

Preliminary Field Reconnaissance: The archaeological overview will require a preliminary field reconnaissance, which will involve a simple walk-over or pedestrian survey of the study area using either systematic or judgmental site sampling techniques. Reconnaissance survey will be
undertaken in the event that historical, archaeological, ethnological, or other documentary sources necessary for assessing the archaeological resource potential of the study area are insufficient or unavailable. It has been documented by the National Museum that the archaeology of the region is poorly understood, therefore; it will be a challenge to complete a comprehensive survey within the project time framework. Adequate information will, however, be collected to identify key risk areas and develop a management plan for construction when the highest impact is likely to occur.

The reconnaissance survey will be designed to assess the archaeological resource potential of the study area, and to identify the need and appropriate scope of further field studies. Although this may involve some ground reconnaissance, aerial coverage will usually be quite small relative to the overall size of the study area. This preliminary survey will seldom provide sufficient data to ensure an adequate estimate of all archaeological sites in an area. However, information resulting from preliminary field reconnaissance will:

• confirm or refute the existence of archaeological sites reported or predicted from documentary research;

• allow further predictions to be made about the distribution, density and potential significance of archaeological sites within the study area;

• Identify areas where sites are apparently absent, implying low or no potential;

• verify, wherever possible, potential impacts imposed by the development project.

Equipment: For the reconnaissance survey two instruments will be used;

• GPS 12XL. Will be used to record exact location coordinates and elevation of archaeological sites.

• Electronic Distance Measuring Instruments (EDMI) will be used where archaeological sites are located

• Auger: will be used in areas of suspected archaeological importance to understand the stratigraphy.

7.4.2 Visual Aspects

In order to determine the magnitude and significance of the possible impact it is necessary to determine the Genius Loci, or spirit of place of both the site and the local environment.

Aesthetics and visual impact have in recent years become relevant issues and are raised on a regular basis during the scoping phase of most large-scale projects.

The purpose of this visual study will be to determine the impact of the proposed development on the visual and aesthetic character of the area. The rationale for this study is that the construction
of a power station and associated infrastructure may fundamentally alter the landscape character and sense of place of the local environment. The primary objective of this specialist study is therefore to identify the potential impact of the proposed development on the visual character and sense of place of the area. This specialist study will have the following objectives:

- To describe the visual character of the site by evaluating components such as topography and current land use activities.
- To identify elements of particular visual quality that could be affected by the proposed project.
- To describe and evaluate the visual impacts of the individual components of the proposed project from critical areas and view fields.
- To recommend mitigation measures to reduce the potential visual impacts generated by the components of the proposed project.
- To determine the extent of the visibility of the project from surrounding areas.

**Approach and Methodology**

Various steps will be required as part of the assessment.

- **Phase 1: Environmental Scoping**
  
  Determine, through an initial site visit and discussions with the project team and the Client, what the potential visual issues could be.

- **Phase 2: Environmental Impact Assessment**

  The method includes the following:
  
  - Step 1: The definition of the visual characteristics of the project
  - Step 2: The definition of the visual environment
  - Step 3: The determination of visual impacts
  - Step 4: The identification of mitigation measures

  This section will cover the method and criteria used for the various aspects.

- **Existing characteristics**

  Map existing features that make visual resource important, landforms, views, historic areas / points, districts.
The criteria used for defining areas would be established during a site visit.

- **Visual obstruction**
  - Map areas that could be visually obstructed by structures.
  - Use distance from object to determine visual obstruction.
  - Zone degree of visual obstruction from various land uses.
  - Determine Visual Absorption Capability (VAC) i.e. the capacity of the landscape to accommodate proposed development.
  - The criteria used would be based on visual inspection on site as well as distance from existing land uses.
  - Distance from object and general number of people affected would be used to determine significance of visual obstruction.
  - Cone of visual obstruction from key viewpoints would be determined if necessary.
  - Visual Absorption Capacity will be determined for various zones using slope, vegetation and visual pattern (texture).

- **Aesthetic and Genius Loci (Sense of Place)**

  This comprises two elements:
  - the visual contrast; and
  - the visual quality. Each can be divided into a near and far situation as far as the viewers of the area are concerned.

- **Visual contrast**

  This is the difference in fit of the project onto and into an established area which will have its own visual character.
  - Describe the visual character of each zone as identified at the time of the site visit. This will be done according to bulk, height, shape, colour, proportion (height to width).
  - Determine and describe the contrast in relation to the existing setting. If the contrast is considered to be strong, more detailed analysis will need to be conducted by considering simulations of the project from key view points. This will be handled with photographs.
  - Criteria used will be bulk, height, shape, colour, proportion, line, texture, and form.
• **Visual Quality**

The visual quality is defined and zoned in the analysis stage and has to do with settings that are already recognized, e.g. parks, distant views, picturesque, architectural, district, natural areas, and mature trees.

The significance ratings may have to be checked through the public involvement process.

• **Phase 3: Environmental Management Plan**

Determine short and long term mitigation measures that will reduce negative visual impact or enhance the positive impacts.

**7.4.3 Health and Safety**

This component of the EIA will address potential health risks and impacts to the affected community from project activities. The operational phase of the transmission line should not have many health impacts apart from possibly those associated with electromagnetic field (EMF). The potential effects of EMF will be investigated during the EIA. Although unlikely, the severity of safety impacts is high along the routes. These will be investigated and mitigatory measures will be recommended.

As part of the Assessment, individuals and groups will be identified that may be differentially or disproportionately affected by the project because of their disadvantaged or vulnerable status.

Where groups are identified as disadvantaged or vulnerable, the results of this assessment will propose and differentiated measures so that adverse impacts do not fall disproportionately on them and they are not disadvantaged in sharing development benefits and opportunities.

A desktop review of available health information will be undertaken.

**7.4.4 Social Impact Assessment**

Social Impact Assessment (SIA) is concerned with the management of social change, and as such provides planners and decision-makers with essential information to enhance benefits and lessen the social costs of a project. To manage social change effectively, it is important to predict the capacity of the affected population to adapt to changing conditions. In order to achieve this adequately, the SIA will need to have access to current project information and accurate project descriptions.

The desktop social assessment for the proposed Mmamabula Energy Project (MEP) involved the identifying of anticipated socio-economic impacts through a cursory analysis of the project’s potential area of influence. The outcome of a complete Scoping process will be used to fine-tune the SIA ToR to ensure that it addresses all issues of concern raised by affected communities and other stakeholders.
Due to the nature of potential social impacts from the proposed Mmamabula project it will be necessary to undertake a full SIA in order to:

- Understand the baseline socio-economic conditions within the area of operation, and how it relates to the local economy.

- Identify socio-economic aspects/issues which may become problematic if not adequately addressed, and predict the potential socio-economic and cultural impacts that may result from the project. This exercise will take into account new IFC standards to include labour and working conditions, land acquisition, resettlement, and indigenous people where appropriate.

- Advise interested and affected parties on their rights and responsibilities with regard to the application of project-related government policies, programmes and procedures that may affect their lives. This will be undertaken with a focus on appropriate and accessible information.

- Provide a framework Social Action Plan for the facilitation of sustainable local economic development. The Framework Plan will identify/analyse local community needs and priorities in relation to new opportunities for local procurement, small business development and alternative livelihood strategies associated with the Mmamabula project and related activities.

- The geographic extent of the SIA will be influenced by the project design and will respond to relevant social information as it becomes clear. In sum, the SIA must develop suitable consultation strategies and management measures to optimise opportunities, mitigate adverse impacts and develop capacity with affected population and vulnerable social groups.

**Project Aspects Included in Scope of Work**

- In addition to augmenting the Social Scan, the SIA must identify, review and augment information on the concerns, priorities, issues and attitudes of affected and host populations as reported in the Social Scan.

- The social analysis must include a description of historical contexts, socio-economic characteristics, institutional framework, land tenure, settlement patterns, employment or unemployment, education, the use of physical infrastructure, natural and cultural resources, development constraints, economic activities, as well as the needs and priorities of those affected.

- The SIA should describe the socio-political dynamics in the broader project area, identify the social aspects and predict the anticipated social impacts associated with the project (including cumulative/incremental impacts), followed by a projection and analysis of impacts and possible alternatives.
• The main concern of the SIA should not only be the identification and assessment of negative impacts but also the management of unrealistic stakeholder expectations.

• The SIA must include recommendations aimed at optimizing positive outcomes and opportunities that could add value in terms of promoting sustainable development in the affected area and communities.

• The final SIA report should include recommendations pertaining to social safety measures to protect affected entities and receiving communities against the risks of impoverishment, whilst promoting increased equity in the distribution of project benefits.

• The SIA must distinguish between (a) project stages, (construction, operation, decommissioning), (b) internal/external, as well as primary/secondary stakeholders, (c) direct/indirect impacts of a positive/ negative nature, as well as (d) short, medium and long-term impacts.

• The assessment must contextualise available information against the background of current regional policies, plans and programmes regarding mining and associated development initiatives.

• Assessment of impacts should be in terms of their nature; extent, magnitude and significance before and after mitigation.

Approach and Methodology

The SIA will firstly be fully integrated with a separate and effective public consultation and disclosure plan, secondly describe the proposed project and identify alternatives, and thirdly describe the socio-economic environment and assess the anticipated project impacts. The project zone of influence, in terms of spatial-temporal scales, must include affected and host populations, as well as the receiving communities.

As the social impacts of the transmission line will be relatively minor in comparison with the total MEP, the household survey for the transmission line will be based on the questionnaire used for the villages directly affected by the mine and power station. Three of these villages, Mmaphashalala, Mookane and Dibete will also be affected by the transmission lines.

The social investigation will focus on local government capacity, the affected communities (households, local structures vulnerable social categories), non-governmental organisations, businesses, local institutions, local economic activity and development opportunities, as well as community services and socio-political dynamics.

The final assessment of impacts will be undertaken in accordance with the methodology required by ERM. This will be supplied and assessment will be carried out through an integrated process of sharing information between specialists involved in the broader project.
Alternatives to be Considered

Due consideration will be given to the anticipated impact of the presence of construction workers and job-seekers on the health and social welfare of the affected population, including the impact of HIV/AIDS. Municipal and social services/facilities in the broader project area (schooling, housing, security), will need to accommodate the influx of people and require proper planning and service provision.

Construction impacts relate to loss of access and mobility, air, noise water and dust pollution, safety and security issues, informal settlement, increased road traffic, groundwater depletion and the impact of foreigners on the local culture.

7.4.5 Socio-economic Environment

The Economic study will assess the economic impacts of the Mmamabula Project Transmission Line at a local/ regional level. As an option, the Economic study will also include a quantitative National level study as described below.

The local level study will assess the socio-economic impacts of the project on the local communities and local stakeholders. It will do this through the collection of baseline economics information to benchmark existing conditions and predict potential impacts of the project on the local economy and stakeholders. In addition, it will include some national level analysis for comparative analysis and to comply with IFC Performance Standards requirements.

An optional National level study will be a macro-economic study looking at the costs and benefits of the project in terms of GDP, employment, capital formation, revenue from taxes and exports, as well as other economic indicators. This will be a high-level, quantitative exercise and will help to understand the economic impacts of the project at a national level.

‘Local’ Socio-Economic Impact Assessment Objectives

The local economic impact of the Mmamabula project is an essential aspect of the social impact assessment, particularly in light of meeting IFC Performance Standards. The objectives of this specialist study would be to understand the:

- Economic development strategies, plans and objectives of the local and Regional area and Botswana as a whole and how the project would feed into these. This would ensure that any social development goals and projects, identified as both mitigation and optimisation measures, would fit into national socio-economic agendas thereby increasing the sustainability of such projects beyond the life of the mine. Such an approach is in keeping with internationally current trends for corporate social responsibility and long-term planning.

- Local economy in the context of the national economy.

- Key economic issues in the area and the extent to which these would be enhanced, exacerbated or undermined by the project.
• Current industrial and business context in and around the project area, including Gaborone, Mahalapye and the local communities.

• Capacity of local and National businesses to provide goods and services that would be useful to the project.

• Current employment, unemployment and livelihoods characteristics of the local area.

• The availability, accessibility and price levels of goods and services in the area;

• Levels of local poverty, income levels and expenditure patterns and the effect the project might have on these.

• The identification of economically vulnerable groups; and

• The capacity of existing vocational, training and business development institutions to assist in developing local capacity for the project’s employment and procurement requirements.

Baseline Information Required

In order to meet the above objectives, the following information should be collected as part of the baseline data collection and consultation exercise.

The information requirements have been grouped according to the objectives to be met. The objective of finding key economic issues in the area and looking at the local economy in the context of the national economy has not been addressed separately as this will be found from an analysis of all of the economic data and information found.

Information requirements for: the economic development strategies, plans and objectives of the local and Regional area and Botswana as a whole and how the project would feed into these:

• Strategic and economic development plans for the Central District, Gaborone and Botswana;

• Land use plans and visions for the local and regional area.

Information requirements for the current industrial and business context in and around the project area, including Gaborone, Mahalapye and the local communities and the capacity of local and National businesses to provide goods and services that would be useful to the project:

• Local goods and services available

• Sectors of the local economy;

• Size and nature of local businesses;

• Local business capacity and business development opportunities;
• Extent to which businesses meet international contract requirements; and
• Availability, quality and accessibility of training and business development institutions

Information requirements for: current employment, unemployment and livelihoods characteristics of the local area, including reasons and capacity for these:
• Unemployment levels by gender and age;
• Employment by occupation, gender and age;
• Employment opportunities;
• The existence of underemployment;
• Availability and access to employment agencies and the potential for corruption in the employment process;
• Types of livelihoods;
• Literacy levels;
• Skills availability & level of education; and
• Existing employment multipliers at the local/ Regional level.

Information requirements for the availability, accessibility and price levels of goods and services in the area:
• Local markets, sources of goods and services and trade mechanisms;
• Price levels and availability of goods and services; and
• Recent price movements and inflationary characteristics

Information requirements for local poverty, income levels and expenditure patterns and the effect the project might have on these:
• Levels of poverty;
• Average income and wage levels and distribution of wealth;
• Levels of remuneration in the public vs private sector;
• Savings, investment and expenditure culture and activities; and
Terms of Reference – MEP Transmission Line

- Availability of, and access to investment, micro-finance and banking institutions.

In addition, national level information will be required regarding government revenues, economic output and investment characteristics. This will provide a context for the local level assessment and for comparative analysis.

Macro Economic Impact Assessment

A macro-economic study can be included. Although this document focuses on the transmission lines, it would not be possible to commission the power station without the lines, therefore an analysis of the macro-economic impact of the mine and power station will be included in the transmission line EIA and will focus on:

- Balance of payments and foreign exchange reserves;
- Interest rates;
- Inflation;
- Job creation/ employment;
- Output growth; and
- Public revenue.

These would be analysed in terms of spatial implications i.e. looking at the effects of these at a District as well as National level. This is not seen to be a requirement as per the IFC Performance Standards, but can provide insight into any significant effects that this might have on the national and provincial economy. As these are likely to be positive, it can be of major benefit to the project to undertake an assessment of this sort. In addition, as transparency in the disclosure of information and reporting is encouraged through the IFC Performance Standards and Equator Principles, it is highly recommended that a study of this sort is undertaken.

Alternative to be Considered

Alternatives to be considered relate to:

- Procurement of goods and services at a Local/ National level rather than from abroad;
- Employment of a maximum amount of Local/ National labour rather than utilising an expatriate workforce; and
- Development of a village/ town in place of a temporary construction camp, thereby contributing to the economic development of the area.
Should these not be considered as alternatives to the project, they would be an important part of the project’s mitigation and optimisation strategies.

Macro-Economic Impact Assessment
The quantified macro-economic impact assessment would be commissioned by ERM as a specialist study. It would likely entail a detailed multiplier analysis and macro-econometric modelling. ERM’s economic team would take responsibility for commissioning this study, monitoring, review and quality check and integration into the ESIA report.
8 BASELINE ENVIRONMENTAL INFORMATION

8.1 Physical Features and characteristics

8.1.1 Climate
Botswana is mainly arid (62% of the country, with growing season <76 days per year) to semi-arid (38% of the country with 76 to 120 days growing season). The area of interest falls within the eastern rainfall region of Botswana, which is predominantly semi-arid and subtropical. Rainfall varies from 400 to 500mm per annum with a pocket east of 28ºE receiving less than 350mm/annum.

8.1.2 Topography
Botswana is a flat, land-locked country, dominated by the Kalahari Sand Sheet, which covers the underlying geology for more than 80% of the surface area (Global Terrestrial Observing Systems, 2001). It is one of the flattest countries in Africa. Most of the study area is approximately 1 000 m above mean sea level. A few small hills such as the Mokgware, Tswapong, and Shoshong Hills around the towns of Mahalapye and Palapye were evident in the general area of interest. These hills rise to just above 1,300 m and are isolated topographical features in the otherwise flat landscape of the region.

8.1.3 Geology
The geological investigation along the proposed transmission route has not yet been completed but there is no significant impact anticipated by the transmission line on the geology and the baseline conditions are not considered critical at this stage of the study.

8.1.4 Surface Water
As a result of this Kalahari Sand Sheet there are few permanent surface water features. Much of the country depends on groundwater (Global Terrestrial Observing Systems, 2001). There are many small non-perennial streams in the area of the proposed transmission line. These generally flow from the north west to the south east, eventually joining up with the Limpopo River.

8.1.5 Groundwater
Similarly to geology there is no impact is anticipated impact on the groundwater along the proposed routes associated with the construction or operation of the transmission lines. Baseline groundwater information has been obtained for the mineral lease area and is presented in the ToR for the mine and power station.
8.1.6 Air Quality

The main sources of emissions in this region include power generation (at Moropule, near Palapye), agricultural activities, vehicle entrainment on unsurfaced roads, domestic fuel burning and biomass burning.

8.1.7 Noise

Apart from the noise generated by the vehicles travelling along the main A1 road and by the activities associated with the towns and villages, the general description of the ambient noise climate of the area is rural. Ambient levels in this rural environment are therefore low. The noise levels associated with the A1 will, however, be generally higher.

The noise sensitive areas that were identified as possible areas of noise impact from the transmission line were Mosomane, Dibete, Mookane, Mahalapye and Dikabeya.

The present ambient noise levels were measured at Dibete and Mookane. In terms of their noise climates Mosomane and Dikabeya are comparable to Dibete, and the outskirts of Mahalapye can probably be compared to the centre of Mookane.

The present ambient noise level at both the measurement points conform to the guideline levels specified by the World Bank, i.e. 55 dBA during the day and 45 dBA during the night.

The topography of the area of the proposed development is very flat, i.e. there will be no screening against the propagation of noise from the source to the receiver.

The vegetation is predominantly of a scrub bush and tree type and the ground conditions are to a large degree very sandy. These conditions will provide attenuation of the noise as it propagates from the source to the receiver.

8.1.8 Soil

The Botswana ecoregion lies in the centre of the Great African Plateau. Most of the ecoregion is covered by sediments of the Kalahari group (mostly Kalahari Sand) and is termed the Sandveld or the Kalahari. The soils of this region are deep (up to 150 m) and are mostly arenosols of poor water-retention capacity. To the southeast of the ecoregion, the sandveld grades into an undulating plain, called the hardveld. The rock formations underlying the hardveld are varied and have led to a profusion of complex rock formations and various vegetation types in the area. The soils of the hardveld are highly leached, ferruginous and tropical, and are more arable than those of the Kalahari. The study area is considered part of the hardveld.

8.1.9 Land Capability

Land capability investigations to date, indicate the area has a capability that is predominantly wilderness and grazing. Although limited subsistence agriculture occurs along the transmission line routes, the soils and climate of the region will not support large scale, commercial crops.
8.1.10 Land Use

The study area is characterised by agricultural land and rural settlements. The area is predominately tribal land which is mainly used for livestock grazing and subsistence farming. A few private farm owners have been identified in the Palapye region. Further consultation is required to identify other private land owners and their positions in the study area.

The land tenure system in Botswana’s rural areas is administered through the Land Tribal Act (1968, amended 1993). The study area covers four land boards and sub-land boards respectively: the Ngwato Land Board, Palapye Sub-Land Board, Mahalapye Sub-Land Board and a small portion of the Kgatleng Land Board. Certain settlements may be affected by the proposed corridor alignments. However, this impact is anticipated to be generally peripheral, and could be avoided through a realignment of the transmission lines within the study area corridors.

Some agricultural activities such as cattle grazing and maize farming are permitted within the transmission line servitude. However, any type of activities that are higher than 4 m will be restricted. This information will be forwarded to the all affected parties in due course. The proposed ‘V’ tower pylons have a small footprint and will, therefore have a very low localised impact in terms of loss of agricultural land.

8.2 Biological Features and Characteristics

8.2.1 Fauna and Flora

Apart from the large wetland areas in the north west of the country, Botswana officially falls within the savanna biome. The tree density and height varies from sparse low shrubs (frequently *Acacia* species) in the more arid regions to taller, near-closed canopy *Baikaea plurijuga* woodlands in the more moist regions. There are substantial areas covered by stands of *Colophospermum mopane*. Crop agriculture is confined to a relatively small area on the eastern and northern margin of the country, with the principal crops being maize, sorghum, millet and pulses (Global Terrestrial Observing Systems, 2001)

Historically this vegetation supported a large, migratory ungulate community with obvious attendant predators. The erection of veterinary fences and the encroachment of cattle into these former wildlife areas have, however, greatly reduced this phenomenon. (Global Terrestrial Observing Systems, 2001)

The Vegetation Map of the Republic of Botswana (Soil Mapping and Advisory Services Project, 1991) shows that the proposed transmission line crosses a number of different vegetation units. These units are referred to as map units. The relevant map units are described below:

**B8a**: The major vegetation grouping is Hardveld. The alliance is typified by *Colophospermum mopane* and *Acacia nigrescens*. The key species of the association are *Combretum apiculatum* and *Acacia tortilis*. The vegetation structure consists of Shrub Savanna, Savanna and Tree Savanna.
**B7a:** The major vegetation grouping is Hardveld. The dominant and prominent species are *Combretum apiculatum, Acacia nigrescens* and *Acacia tortilis*. The vegetation structure consists of Shrub Savanna, Savanna and Tree Savanna.

**B6b:** The major vegetation grouping is Hardveld. The alliance is typified by *Peltophorum africanum* and *Acacia tortilis*. The key species of the association is *Terminalia sericea*. The vegetation structure consists of Shrub Savanna and Savanna.

**G16b:** The major vegetation grouping is Transition Sandveld – Hardveld. The dominant and prominent species are *Terminalia sericea, Acacia tortilis* and *Acacia mellifera*. The vegetation structure is Savanna.

**H17b:** The major vegetation grouping is Mopane dominated. The alliance is typified by *Colophospermum mopane* and *Terminalia sericea*. The key species of the association is *Sclerocarya caffra*.

Due to the land use patterns and the lack of officially protected areas it is expected that there are limited numbers and populations of wild animals inhabiting this region. The level of disturbance to vegetation varies through the study area but does incorporate suitable potential habitat for certain species. Animals that can co-habit areas with people and subsistence farming activities are expected to be found here, although not in large numbers due to hunting activities by the local people.

### 8.2.2 Avifauna

The bird life is generally dependent on the availability of suitable habitat and food sources. The availability of natural, albeit relatively disturbed, vegetation should support many bird numbers and populations.

**Wetlands**

These consist of permanent and temporary watercourses, drainage lines, pans, dams, borrow pits and vleis. This habitat supports a rich variety of transmission line sensitive waterbirds such as ducks, waders and storks. There are sites of potential large water bird concentrations further south along the proposed route. These consist of numerous small and medium-sized temporary wetlands that fill up with water after rains, attracting large concentrations of waterbirds such as ducks, geese, storks, spoonbills and ibises.

**Open country**

This includes areas grazed by domestic stock with or without woody plants, and areas where trees have been cleared for growing crops. Ground cover is sparse or totally lacking in places. Cultivated areas provide alternative habitats within the surrounding savanna; they may have been recently ploughed, planted with growing crops or with stubble and weeds after harvesting. Cultivated areas may also contain fields lying fallow (with thick grass and herb cover after rain and often scrubby with growth regeneration). Species such as White and Abdim’s Stork are likely
to occur on ploughed fields or bare fallow lands. Extensive areas of fallow land may be used by Secretarybirds.

**Hills**

Botswana is generally a flat country, but a number of important hills occur in the region that provide vital habitat for a number of power line sensitive species. The most important hills in the study area from a bird perspective are the Tswapong Hills near Palapye, where virtually the entire eastern population, of the globally threatened Cape Vulture, in Botswana is concentrated. The population has been subjected to severe disturbance by people and it is speculated that this factor lead to the collapse of the biggest single breeding colony of the species in eastern Botswana at Bonwalenong.

### 8.2.3 Sensitive Areas

Because the area of interest consists predominantly of tribal grazing lands, there are no areas such as game reserves officially protected for their conservation value.

Some small temporary wetland areas were noted along the proposed routes on the satellite image. Fitting in with the dominant land use of this region, these wetland areas are important for the watering of livestock.

Other areas of potential significance are those where the transmission lines cross the rivers and streams. These riparian zones give rise to different vegetation types and larger trees due to the nature of the soil form and increased availability of a water supply. These zones are important as they provide habitat for animal species and generally support abundant bird life. In this region the rivers and streams are non-perennial. The Limpopo River generally contains water all year round although during the dry winter months, this will be standing water.

### 8.3 Cultural and Socio-Economic Features and Characteristics

#### 8.3.1 Sites of Archaeological Significance

An initial archaeological assessment of 160 km of the route was undertaken during September 2006. The findings will be included in the archaeological impact assessment (AIA) for the project. Further assessments will cover the proposed routes to the South African border.

According to the assessment, ten archaeological sites were identified. The potential impacts on these sites as a result of the construction of a transmission line will generally be as a result of the clearing of servitudes, the placement of towers, and possible visual impact on historical sites.

#### 8.3.2 Visual Aspects

Currently the visual environment, in terms or aesthetics value, varies over the area of the proposed transmission line routes. Due to the relatively flat nature of the region the viewshed is large with the line potentially visible for over 10km. From ground level, however, the vegetation
in the area will provide effective screening. Along the proposed western alignment, there are not many industries that rely on the aesthetic value of the visual environment and the impact is therefore predicted to be negligible.

8.3.3 Socio-Economic Environment

The proposed transmission line routes traverse through 2 districts; namely: the Central District and the Kgatleng District. The Central District is divided into five administrative sub districts. The proposed transmission line routes will run through the Mahalapye Sub-District, the Serowe/Palapye Sub-district and a small portion of the Bobirwa Sub-District.

The Kgatleng District may have minor disruptions related to this project but the extent of these disruptions are not clear as the planned Mosaditshweni substation in this district will be built by the Botswana Power Corporation (BPC). This task does not fall within the Mmamabula Energy Project’s scope of work, hence, the information provided below mainly concerns the Central District.

The demographic data for the Central District reflects that 47.7% of the population is below the age of 15 years. This results in a high dependency ratio as this category is dependant on income earners. The majority of communities in the Central District are characterised by low employment levels and low incomes. However, it is not anticipated that the proposed project will create a significant number of employment opportunities, as the construction activities associated with the erection of towers and stringing of conductors usually require highly skilled labour.

Population growth in the area is high, however, HIV/AIDS is prevalent and this is of great concern as it will directly affect the active working group of people (12-49 yrs).

The dominant economic activities in the district are mining, agriculture (both arable and pastoral), as well as industrial and commercial undertakings. In the study area the main economic activities would be agriculture and mining. While agriculture occurs across a large area, mining activities are limited to the areas immediately surrounding the substations at Moropule and Phokoje.

Limited opportunities exist for manual labour where the appointed contractor could make use of locals (e.g. bush clearing and installation of gates). These opportunities will, however, be of short duration. Therefore, it is not anticipated that there will be an influx of workers into the area as a result of the proposed project.
9 PUBLIC PARTICIPATION PROCESS

9.1 Introduction

Public participation is a key component of any Environmental and Socio-economic Impact Assessment (EIA). It involves those interested in, or affected by, the proposed development in highlighting issues of concern and in assisting the project designers to take account of locally relevant conditions as opposed to imposing a socially and environmentally insensitive design onto an environment.

In this project adherence is paid to a combination of Botswana legislation (EIA Act 6 of 2005) as well as the International Finance Corporation’s (IFC) Performance Standards for Environmental and Social Sustainability (April 2006) and the Equator Principles (March 2006) in as far as they all pertain to stakeholder engagement in projects of this nature and magnitude.

This Public Consultation and Disclosure Report includes the findings of the first round of authorities and public participatory meetings held at the national and district levels as well as meetings in the four villages within the project affected area of the mine and power plant. Additional meetings are planned with these communities, as well as any still to be identified, once the corridor for the transmission lines is more clearly defined.

9.2 Objectives and Strategy

Public Participation aims to create an environment of informed and constructive participation of all parties interested in, or affected by, a proposed development. It is a two-way interaction, not aimed at avoiding conflict but rather at facilitating a process in which people feel heard and included in decision-making and project design and where satisfactory outcomes are identified.

Public Consultation and Disclosure aims to achieve the following:

- Identify all relevant Interested and Affected Parties (I&APs) for this project;
- Distribute accurate project information;
- Gather information that will contribute to the environmental and technical investigations;
- Form partnerships to promote constructive interaction between all parties;
- Address any potential conflicts that may arise;
- Record and address public concerns, issues and suggestions;
• Manage Yaps’ expectations; and

• Fulfill Botswana and international requirements for consultation.

The IFC Performance Standard 1, as well as the Equator Principles, highlights the need for ongoing and appropriate communication between the developer and affected parties from an early stage of the project through implementation and until closure. The process must pay particular attention to ensuring that vulnerable groups are included and that information is shared with ALL stakeholders in easily accessible forms (i.e. media used; language and style of information facilitation). To this end a Public Consultation and Disclosure Plan (PCDP) is being developed as part of the Social Management System for the MEP, which will include the proposed transmission line. The PCDP is an outcome of the EIA and is tailored to the project environment. In its final form the PCDP will include roles, responsibilities and budgetary requirements, as well as a detailed Grievance Resolution Procedure, for the implementation of ongoing communication from construction through to closure of the MEP.

Figure 1 presents the Public Participation Process (PPP) being followed for the EIA and for the development of the PCDP.
9.3 Approach and Methodology

Two separate EIAs are being carried out for the Mine and Power Plant and for the Transmission Lines within Botswana. In the interest of access to information and for a more holistic understanding of IAP concerns and suggestions regarding the entire project, one integrated PPP has been designed and is being implemented. This means that Yaps are presented with information relating to all aspects of the MEP even where they are only concerned with one.

In approaching the development of a PPP strategy for this project the consultant team has aimed for a rigorous and methodical process that will not only be above scrutiny, thereby limiting
project risks of resistance based on procedural grounds, but will encourage active engagement from stakeholders so that suggestions can be incorporated into project design and so that concerns and conflicts can be openly addressed in an ongoing manner.

The methodology to date has included:

- Stakeholder identification (including special interest and vulnerable groups);
- Site visits;
- Development of appropriate documentation;
- Stakeholder notification (through dissemination of information and meeting invitations);
- Participatory meetings with authorities, public and affected communities;
- Translation and distribution of minutes; and
- Social Impact Assessment field-work.

9.3.1 Assumptions

The following assumptions underlie the development of the approach and methodology for the PPP:

- The developer has made, and will continue to make, all available project planning information accessible to the public participation team to share with Yaps;
- The process of public participation is entered into in good faith with the developer open to issues raised and concerns expressed, and willing to incorporate relevant suggestions into the project design;
- Responses from Yaps contained in this report are based on information available and provided during meetings in late August and early September 2006;
- The project will be developed in accordance with the highest international practices and will meet the Equator Principles and IFC Performance Standards; and
- The project has no intention of impacting on the physical villages (neither by developing project infrastructure nor by undermining villages) so as to necessitate their resettlement.

9.4 Public Consultation and Disclosure

Following the various participatory meetings held in August/September 2006, a number of issues and risks were identified. The key issues will already be included in the Terms of Reference of
the ongoing specialist studies and impacts identified in the relevant sections will highlight the nature of these risks for the project and for the stakeholders. What is presented below is a table of issues from the perspectives of participants.

### 9.4.1 Findings

Key findings from participatory meetings, together with their related risks are presented below in Table 9:

**Table 9: Outcomes of Public Participation Process**

<table>
<thead>
<tr>
<th>Aspect and Issue</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>POLLUTION</strong></td>
<td></td>
</tr>
<tr>
<td>Air Pollution and related human health risks</td>
<td>Compromised human health.</td>
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<tr>
<td>Emissions from the Power Plant (particularly</td>
<td>Health liabilities for the developer.</td>
</tr>
<tr>
<td>sulphur emissions) are seen as a health hazard to</td>
<td>Conflict between residents and the developer based on a perception of</td>
</tr>
<tr>
<td>local residents and particularly to those</td>
<td>callousness in dealing with “other people’s” health risks.</td>
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<tr>
<td>downwind of the Power Plant.</td>
<td>Demand from residents to be formally resettled to areas safe from</td>
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<td>Dust, particularly from the waste and discard</td>
<td>project-related pollution.</td>
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<td>dumps, (but also from the additional road traffic)</td>
<td></td>
</tr>
<tr>
<td>is likely to impact on the health of local</td>
<td></td>
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<tr>
<td>residents and will blow waste material dust onto</td>
<td></td>
</tr>
<tr>
<td>the villages of Mmaphashalala and Mookane.</td>
<td></td>
</tr>
<tr>
<td>Air pollution and related animal and plant risks</td>
<td>Loss of agricultural productivity upon which people’s survival</td>
</tr>
<tr>
<td>Most subsistence activities in the area are based</td>
<td>often depends.</td>
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<tr>
<td>on agriculture and livestock. Air pollution from</td>
<td>Risks to heath of livestock, which are used both for food and for</td>
</tr>
<tr>
<td>the mines, Power Plant and roads (gaseous</td>
<td>income, places people’s food and livelihood security at risk.</td>
</tr>
<tr>
<td>emissions and dust) may put the health and</td>
<td></td>
</tr>
<tr>
<td>productivity of these animals and plants at risk.</td>
<td></td>
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<tr>
<td><strong>WATER</strong></td>
<td></td>
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<tr>
<td>Project activities and a resulting loss of water</td>
<td>Project activities could leave local residents and land users with</td>
</tr>
<tr>
<td>quantity and quality available for subsistence</td>
<td>insufficient water to meet their needs in the short, medium and</td>
</tr>
<tr>
<td>and economic requirements</td>
<td>long term.</td>
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<tr>
<td>Several project induced activities will impact</td>
<td>Farms in the area could be similarly affected with risks to livestock</td>
</tr>
<tr>
<td>negatively on the scarce water resources in the</td>
<td>and crops. There are</td>
</tr>
<tr>
<td>Prospecting Lease. These activities include:</td>
<td></td>
</tr>
<tr>
<td>Drilling for water at deeper depths than existing</td>
<td></td>
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<tr>
<td>boreholes;</td>
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<tr>
<td>The opening of faults and fractures will result</td>
<td></td>
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<tr>
<td>Aspect and Issue</td>
<td>Risk</td>
</tr>
<tr>
<td>------------------</td>
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</tr>
<tr>
<td>drainage of existing aquifers; Drainage into the mine and seepage from the mine; Discharge into ground water from the wash-plant and discard dump would create pollution, particularly considering that both of these water sources will contain high levels of sulphur. The long-term sustainability of water resources in the Prospecting Lease, and down stream, could be compromised. Poor management of contractors has already resulted in pollution, which jeopardises the quality of ground water.</td>
<td>financial consequences from this. The quality of potable water could fall below WHO standards and become unacceptable given already low quality. The developer is likely to be held liable for any reduced availability and quality of water – whether warranted or not.</td>
</tr>
</tbody>
</table>

**Undermining of rivers**

Undermining of the Bonwapitse River could have detrimental effects on this important and relatively consistent water resource. Undermining the river risks the development of fractures and fissures, which could result in losing water in this important source. Mining impacts on water bodies, such as rivers, are high profile issues for international environmental organizations. However, if project design is finalized to include undermining the river, it would be necessary to include relevant organizations into the IAP database to ensure no legal challenge at some later date.

**LAND**

Project footprint and loss of access to land

Project infrastructure (mine portals; processing and power plants; transmission lines; conveyor belt and fencing; accommodation and transport routes) will reduce the availability of agricultural and grazing land owned and used by individuals and communally. The conveyor belt will cut off access to land for various land users. Loss of land and, in this case more specifically, loss of access to economic activities currently undertaken on the land, could necessitate resettlement of a number of land-owners and land-users. Resettlement is a complicated activity and is a last resort in the view of IFC Performance Standards. It has significant emotional, financial and time implications.
### Terms of Reference – MEP Transmission Line

<table>
<thead>
<tr>
<th>Aspect and Issue</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>The placement of Transmission Lines will limit the choice of land use within the specified corridor.</td>
<td>Loss of access to land, whether privately or communally owned will require a process of compensation. The greater the project footprint the greater the loss of land. Fencing of the 20-25km conveyor belt corridor makes access to one side or another extremely difficult and may result in people losing access to their source of food and livelihood security.</td>
</tr>
</tbody>
</table>

#### Undermining and subsidence

| Subsidence, of up to 8m in areas, will render land inaccessible to people and animals for safety reasons. | Subsidence is a safety risk for people and animals in the undermined area. The developer would be held liable for loss or damage related to accidents resulting from subsidence (for humans and animals). The potential for subsidence in any village would necessitate resettlement of the affected community. This would require a Resettlement Action Plan, which would take at least a year to develop in an internationally acceptable manner. On the surface, the undermined area should be easily accessible for grazing. If all undermined areas are unsafe this access becomes impossible and the project footprint will increase dramatically, as will the number of people directly affected by the project. Depending on the extent of people's loss of access to land and livelihood, the undesirable option of involuntary resettlement will have to be considered. |

#### Subsidence and sites of cultural significance

| Subsidence, particularly along the river, will put iron and stone age sites, of which there are several, at risk. | Cultural Heritage is seen as a significant aspect of Botswana’s historical resources and is specifically highlighted for separate submission within the EIA Act of 2005. |
Iron and Stone Age sites have been identified within the Prospecting Lease. Depending on the status of these sites, their destruction will be a heritage loss not only for Botswana but for the continent and even more globally.

### CULTURAL HERITAGE

**Aspect and Issue**  
Project activities in relation to sites of cultural significance

**Risk**  
Cultural Heritage is seen as a significant aspect of Botswana’s historical resources and is specifically highlighted for separate submission within the EIA Act of 2005.

Iron and Stone Age sites have been identified within the Prospecting Lease. Depending on the status of these sites, their destruction will be a heritage loss not only for Botswana but for the continent and even more globally.

### SOCIAL CHANGE

**Aspect and Issue**  
Project-induced social change

**Risk**  
The project will be held accountable for negative changes in existing social behaviour and the consequences of such changes.

Tension and conflict between local residents and outsiders.

Loss of internally functioning social management structures could result in reduced social cohesion, where it exists.

Increased pressure on policing resources, which are probably already very small.

Increase risks of family breakdowns and potential increase in domestic violence may result from changes in social behaviour (e.g. extra-marital affairs; prostitution; alcohol abuse).

Increased exposure to and risk of sexually transmitted diseases (particularly HIV/AIDS).
### Aspect and Issue

<table>
<thead>
<tr>
<th>Aspect and Issue</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in sense of place</td>
<td>which is already extremely high in the country.</td>
</tr>
<tr>
<td>The sense of place of the Prospecting Lease will change dramatically.</td>
<td>These types of changes will be impossible to anticipate and are likely to be quite significant for people used to the current rural environment.</td>
</tr>
<tr>
<td>There is likely to be a loss of potential land-uses (e.g. tourism) because of an altered sense of place.</td>
<td>People’s desire to live in the project-affected area may drop because of the very stark contrast between a sense of the rural/pristine and the new reality of a noisy, busy and potentially polluting industrial complex.</td>
</tr>
<tr>
<td>Visual and noise impacts will alter the sense of place.</td>
<td>The value of privately owned land may drop.</td>
</tr>
</tbody>
</table>

### CLOSURE AND REHABILITATION

<table>
<thead>
<tr>
<th>Closure and post-closure potential for degradation of physical and social environments</th>
<th>The long-term health of the people and biophysical environment are dependent upon responsible design and project implementation that includes rigorous approach to closure.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The project will leave behind it a long-term legacy through the remaining ash dump and other permanent alterations to the landscape.</td>
<td>Exposed areas of land that are not appropriately rehabilitated are likely to become increasingly degraded.</td>
</tr>
<tr>
<td>Areas within the project footprint where infrastructure is removed at closure will expose the soil to the elements.</td>
<td>Inappropriate planning for monitoring and auditing may facilitate poor rehabilitation and allow increased degradation in the long-term.</td>
</tr>
<tr>
<td>Acid rock drainage may contaminate ground water.</td>
<td>The developer will be held liable for the state of the environment at closure and beyond.</td>
</tr>
<tr>
<td>Lack of capacity and resources to audit compliance with closure plans may result in a number of breaches in procedures and contracts.</td>
<td>There is increasing pressure to ensure that legislation enables retrospective prosecution of companies and individual directors for environmental degradation.</td>
</tr>
<tr>
<td>Use of only outsider auditors will risk inappropriate action taken as a result of inadequate local knowledge.</td>
<td>Breakdown of infrastructure left after closure can create an environment of decay (e.g. housing that has been handed over to a government department that lack capacity to</td>
</tr>
<tr>
<td>Social projects initiated during the life of the mine may prove unsustainable at closure.</td>
<td></td>
</tr>
</tbody>
</table>
### Aspect and Issue

<table>
<thead>
<tr>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>manage such infrastructure). Unsustainable social projects initiated by the developer place those involved at risk. The loss of such projects often leaves people worse off than before if their lifestyles and living costs have changed as a result of inappropriate social development projects.</td>
</tr>
</tbody>
</table>

### EMPLOYMENT

**Project activities and local employment opportunities**

| Give priority to local residents for employment where possible. Be sure to look for skills within tertiary institutions before importing existing skills. | Social conflict between local and foreign employees – particularly where it is felt that local expertise is available. High levels of local unemployment contribute to social problems such as alcohol abuse and domestic violence, creating a socially unstable environment. |

### PUBLIC PARTICIPATION & COMMUNICATION

**Communication may facilitate or hamper local participation**

| Inadequate information about the project reduces people’s ability to make decisions about their futures. Inadequate information creates mistrust between local residents and the developer. | There are perceptions of withholding of information that could undermine trust relationships between communities and developer if left unaddressed. Lack of trust can lead to unnecessary conflict and delays for the project. Individuals within communities have personal agendas that can benefit from a lack of trust between communities and the developer. |

### 9.5 Forthcoming Participation

The first round of PPP meetings identified the need for a follow up round to respond to issues raised and to give up-to-date feedback and a higher level of technical information. Frustrations highlighted by community members about a lack of detailed project information that would enable people to plan for the future, has been acknowledged as part of the limitations of Scoping but will be addressed in this second round. Meetings will be held with the four directly affected
communities and the Tuli Block farmers. These meetings will be attended by a varied technical team that will be able to present information relating to Power Plant technology, a breakdown of emissions from the Plant, motivation for the placement of infrastructure and detailed mapping information on the project footprint. Additional land-take information will be discussed with the intention of initiating full identification of affected land-owners and users as well as to begin compensation planning (and resettlement if necessary). A process, through which a Community Liaison Committee can be established, as requested by affected communities, will also be initiated in the next round of meetings. Two meeting specific to the transmission lines will also be held in Mahalapye and Selebi-Pikwe towards the end of January 2007.

According to the Botswana legislation a Terms of Reference for specialist studies needs to be submitted, and this will include the public participation report. In addition, the development of a Grievance Resolution Procedure has been initiated as an interim measure to allow for the formal documentation and addressing of grievances. This procedure will become a formal structure when it is detailed as part of the Management Plans resulting from the EIA. This will enable ongoing communication between all parties involved in the project from construction through to closure.
10 POTENTIAL ENVIRONMENTAL IMPACTS, ISSUES & MITIGATION MEASURES

Assessment of potential environmental impacts directly resulting from the development of the transmission line will form an integral component of the EIA report. DWA will investigate the potential impact and compile a report detailing the proposed mitigation methods, monitoring plans and other strategies which should be implemented to manage and minimise the adverse impacts.

Aspects of potential adverse impacts which will be identified and assessed during the project will include:

- The source and, or cause of the impact;
- The nature, significance, duration and likelihood of the impact occurring;
- Possible measures for minimising and mitigating impacts.

Specialist studies will investigate the relevant aspects according to their methodology described above in their scopes of work.

10.1 Mitigation Measures

The key objective of the EIA is to identify means of avoiding unnecessary damage to the environmental and socio-economic resources and receptors, safe-guarding valued or finite resources, natural areas, habitats and ecosystems, and protecting people and their associated social environment.

The principles of mitigation measures are:

- Mitigation measures identified need to be feasible and cost-effective;
- Feasible alternatives should also be considered; and
- Customised measures should be identified in order to minimise major impacts.

Mitigation measures are therefore necessary to allow these adverse impacts to be eliminated, offset or reduced to an acceptable level.

Three levels of mitigation measures exist:

- Avoidance:
  - This is the most desirable mitigation measure, as it will allow for the adverse impact to be eliminated.
o Certain aspects or elements of the projects will not be undertaken;

o Environmentally sensitive areas will be avoided;

o Measures will be implemented to prevent impacts from occurring.

- Minimisation:
  
o The project will be relocated or down-scaled;

o Certain elements of the project will be redesigned;

o Measures will be implemented to minimise the impacts.

- Compensation:
  
o This is the least desirable mitigation measure;

o Resources or environmental components will be rehabilitated;

o The site will be restored to its previous condition;

o Environmental values lost will be replaced at another location.

The objective of mitigation measures are often established through legal or best practice standards such as those of the World Bank. Where standards are not available, objectives will be established based on international best practise. The implementation and monitoring of the mitigation measures will be discussed in detail in the EIA.

10.2 Potential Issues and Impacts

Assessment of potential environmental impacts directly resulting from the transmission line development will form an integral component of the EIA report. DWA will investigate the potential impacts and compile a report detailing the proposed mitigation methods, monitoring plans and other strategies to manage and minimise the adverse impacts.

Aspects of potential adverse impacts which will be identified and assessed during the construction, operational and decommissioning phases of the transmission line will include:

- The source and, or cause of the impact;

- The nature, significance, duration and likelihood of the impact occurring;

- Possible measures for minimising and mitigating impacts.
Specialist studies will investigate the relevant aspects according to their scopes of work described above.

The key impacts and risks identified for the transmission line are detailed below in Table 10, as well as the proposed mitigation measures:
### Table 10: Key impacts and identified risks

<table>
<thead>
<tr>
<th>Item</th>
<th>Discipline</th>
<th>Impact</th>
<th>Assumptions</th>
<th>Mitigation/enhancement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment creation and upgrading of local skills</td>
<td>Socio-economic</td>
<td>Positive impact in that local population will be employed and skilled.</td>
<td>There will be local employment but initially external skills will be sourced due to the lack of locally available skills.</td>
<td>CIC to develop and implement local employment and skills programmes.</td>
</tr>
<tr>
<td>Increased Government revenues</td>
<td>Socio-economic</td>
<td>Revenue generated from the export of power will positively impact on the Botswana economy. The distribution of these funds is under the control of Central Government.</td>
<td>The assumption is that Central Government will facilitate upliftment of local communities.</td>
<td>It may be possible to hold talks with Central Government to facilitate local community upliftment.</td>
</tr>
<tr>
<td>Diversification of the local economy and local procurement of goods and services</td>
<td>Socio-economic</td>
<td>The transmission line project will present an opportunity for local diversification through creating opportunities within the supply chain. There could however also be a depression in the local economy at the completion of construction and exit of temporary workforce.</td>
<td>The assumption is that there will be a positive impact on the local economy.</td>
<td>Programs to be developed and implemented to allow for local access to the transmission line development supply chain.</td>
</tr>
<tr>
<td>Disturbance of crops during construction.</td>
<td>Social</td>
<td>Planted crops may have to be cleared or disturbed for construction access.</td>
<td>Approximately 40m wide servitude will either be cleared or disturbed during construction.</td>
<td>Farmers should be adequately compensated for disturbed crops. Agriculture may continue under</td>
</tr>
</tbody>
</table>
## Terms of Reference – MEP Transmission Line

<table>
<thead>
<tr>
<th>Item</th>
<th>Discipline</th>
<th>Impact</th>
<th>Assumptions</th>
<th>Mitigation/enhancement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relocation of households that are situated directly along the proposed routes.</td>
<td>Social</td>
<td>In order to avoid impacts associated with EMF, households directly under the proposed lines will have to be relocated.</td>
<td>Households within 10m of the centre line below the transmission line may potentially be affected by the EMF.</td>
<td>Built up areas and human habitations will be avoided where possible. In a few isolated cases, households may have to be relocated.</td>
</tr>
<tr>
<td>HIV/AIDS prevalence in the labour force</td>
<td>Social</td>
<td>The high prevalence of HIV/AIDS in Botswana could severely impact on the Project labour forces.</td>
<td>AIDS is the leading cause of mortality in Botswana as indicated in Botswana Institute for Development Policy Analysis in 2001.</td>
<td>HIV/AIDS programmes will be considered in future social investigations and incorporated into the EIA.</td>
</tr>
<tr>
<td>Avifauna</td>
<td>Ecological</td>
<td>Transmission lines are known to have a severe detrimental impact on large bird species.</td>
<td>Large species of birds such as many raptors and ground birds occur in the project area.</td>
<td>Various mechanisms can and should be used to minimise collisions.</td>
</tr>
<tr>
<td>Rehabilitation</td>
<td>Ecological, soils, and social.</td>
<td>Servitude used for construction will need to be rehabilitated during operational phase. Land take for infrastructure will require rehabilitation during decommissioning.</td>
<td>Land use post decommissioning will have to be determined to enhance socio-economic requirements. Local occurring sandy soils will not be suitable for rehabilitation of dumps and luvic soils will have to be identified and excavated for this purpose. Ash</td>
<td>Rehabilitation plans including soil management processes are to be developed as part of the EIA. A preliminary cost of R50,000 per ha is to be provided for rehabilitation.</td>
</tr>
<tr>
<td>Item</td>
<td>Discipline</td>
<td>Impact</td>
<td>Assumptions</td>
<td>Mitigation/enhancement</td>
</tr>
<tr>
<td>------</td>
<td>---------------------</td>
<td>-------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Waste Management during construction.</td>
<td>Waste</td>
<td>Community and ecological impacts</td>
<td>Domestic waste will be disposed of in current local government facilities. Hazardous waste will be exported to appropriate South African facilities.</td>
<td>The EIA will incorporate evaluation of proposed waste management practices. Waste management plans will be developed as part of the EIA.</td>
</tr>
<tr>
<td>Archaeological sites</td>
<td>Cultural and heritage</td>
<td>Loss of archaeological and cultural resources in the lease area.</td>
<td>The lease area has a rich and temporally varied archaeological presence.</td>
<td>Undertake detailed investigations of footprint areas prior to construction and develop a chance find protocol.</td>
</tr>
<tr>
<td>Work force and external job seekers</td>
<td>Social</td>
<td>Impacts on the affected population include health and social welfare, safety and security, informal settlement and anti-social-behaviour.</td>
<td>It is assumed that the Project will attract significant numbers of job seekers into the local area. The transmission line operation will not generate a substantial amount of employment opportunities.</td>
<td>Development of policies and procedures to manage expectations with respect to employment and compensation.</td>
</tr>
</tbody>
</table>
11 ENVIRONMENTAL MANAGEMENT PLAN

An environmental management plan will provide a detailed plan for covering mitigation of predicted adverse impacts, management of residual effects, relocation and compensation schemes, decommissioning, and training programmes (OCDE, 1999).

EMPs demonstrate the commitment to alleviating adverse environmental impacts and contribute towards the continual improvement of projects environmental performance. The purpose and benefits of an EMP are to (CSIR, 2004):

- Encourage applicants to be more systematic and explicit in the design and development of mitigation measures and the intended means of implementations;

- Encourage authorities to check the practicality and likelihood of implementation of mitigation and monitoring measures;

- Ensure that the mitigation measures are properly incorporated into the project design and contract documentations after authorisation is granted;

- Encourage the project proponent to meet the requirements of the EMP which now form the conditions attached to authorisation of the project; and

- Force the project proponent to internalise environmental impacts that would otherwise become a social cost.

The content of an EMP will detail the following components:

- Mitigation:
  - Identifies and summarizes all anticipated significant adverse environmental impacts;
  - Descriptions of each mitigation measure, including the type of impact to which it relates and the conditions under which it is required;
  - Estimates of any potential environment impacts of these measures; and
  - Provide a link with other mitigation plans.

- Monitoring:
  - Environmental monitoring during the projects implementation provides key information regarding the projects adverse impacts and the effectiveness of mitigation measures;
  - The EMP will identify the monitoring objects and specify the type of monitoring to take place.
Capacity Development and Training:

- Effective implementation of the mitigation measures is dependent upon the support of environmental units on site or at the agency and ministry level. A description of the institutional arrangement will be included.

Implementation Schedule:

- The EMP will include a schedule for implementing the above three components. The schedule will describe the phases of implementing and coordinating the project, as well as the capital, recurrent cost estimates and sources of funding.

Various Social and Environmental Management Plans will be detailed in the EMP.
12 CURRENT STATE OF THE PROJECT

The first round of PPP has been undertaken, with a second round planned for November 2006. The concerns and comments from these meetings will be addressed in the EIA and, where possible, incorporated into the project design. Feedback meetings will be held once the draft EIA has been made available to the public for review.

The environmental team, managed by Digby Wells & Associates (DWA) and Environmental Resources Management (ERM) is assessing the current baseline environment so that environmental aspects can be incorporated into the project design, and impacts can be assessed.

From the baseline studies already conducted, the significant impacts have been identified. The baseline studies are expected to be completed, for the EIA, in December 2006. This information will be used to compile an impact assessment, based on the methodology given in this ToR, and formulate mitigation measures. An EMP will form part of the EIA and will contain all the relevant plans and management measures required to ensure compliance with relevant Botswana legislation. The results of the baseline studies, the impacts and the mitigation measures will be incorporated into the EIS report and submitted to the Department of Environmental Affairs at the end of January 2007.
13  FURTHER INVESTIGATIONS AND GAP ANALYSIS

The majority of the specialist studies for the transmission lines are not yet complete, however, it is assumed that the scope of the investigation has been satisfactorily covered in this document. Recent aerial photography, which would have assisted greatly, was not available before many of the specialists went into the field. An aerial laser survey of the most likely route alignment has now been commissioned in order to rectify this gap. Should the images from this survey highlight any critically sensitive sites that may have been missed from the ground fieldwork, these will be investigated further with more detailed fieldwork. A visual aerial survey should also be conducted by the necessary specialists involved in the project.

As the proposed routes to the South African border i.e. the Limpopo River have only recently been finalised, these alternatives have not yet had any further investigation. The literature research conducted for the broader study area did, however, include these routes. Field studies of the proposed alignments will be completed for inclusion into the EIA.
14 CONCLUSION

The proposed MEP is dependent on the construction of 400kV transmission lines in order to transmit the electricity that will be generated. These lines are therefore critical to the feasibility of the project. As the power generated by the proposed MEP will be in excess of Botswana’s internal requirements it will be necessary to have the required transmission capacity to export power to South Africa.

A number of key potential impacts have been identified that are currently, or will need to be, addressed during the EIA. The disturbance of land during construction may have an impact on farmland and these farmers will need to be adequately compensated. This disturbance may also result in dust generation, soil erosion and loss of vegetation. Vehicle movement during construction could cause noise and air pollution as well as result in disturbance to livestock and wildlife. Many of the impacts associated with construction will be temporary and can be relatively easily mitigated.

During operation, the impact of the transmission lines will be less than those associated with construction. Pastoral and arable agriculture can be re-established under the lines after construction. The most severe impact on the biophysical environment will most likely be on the avifauna of the area, although in some areas, particularly along river courses, there will be an affect on larger trees as vegetation will need to be maintained below a height of 4m. There will also be an impact on the visual aspect along the route as the transmission lines will be inconsistent with the natural environment. Where human habitation is unavoidable, there may need to be relocation of some households that are directly beneath the proposed routes, however this is anticipated to be necessary in only a few isolated cases.

The findings of the studies described in detail in this document will be presented together with mitigation possibilities and management recommendations in the EIS, which will be submitted to the Botswana authorities by the end of January 2007.
15 INFORMATION CONSULTED AND REFERENCED

Various reference documents and reports have been researched for the project. The information has been sourced from governmental department, libraries, the internet, books, consultants and government printers. The list is detailed in this section and has been categorised accordingly.

15.1 Transmission Line Literature


Modie, B. N. The Department of Geological Survey Coalbed Methane Study, Department of Geological Survey.


The Rehabilitation of Land Disturbed by Surface Coal Mining in South Africa *Handbook of Guidelines for Environmental Protection*. Volume3 / 1981 Chamber of Mines of South Africa


15.2 Social and Socio-Economic Literature


### 15.3 Legal Literature


### 15.4 Botswana Literature


District Land Use Planning Unit, 2000: *Central District Integrated Land Use Plan, Volume 1 – The Plan*. Gaborone (Hard copy only)


### 15.5 Physical Environment


Terms of Reference – MEP Transmission Line


Low, AB AND Rebelo, AG (eds) 1996. *Vegetation of South Africa, Lesotho and Swaziland*. Department of Environmental Affairs and Tourism, Pretoria

Roberts 2003 Roberts’ Multimedia Birds of Southern Africa


Plan 1: Regional Setting
Plan 2: Proposed Routes of the Transmission Line
APPENDIX C

APPROVALS FROM DEA
REF: DEA/BOD 7/9 XX (51) DATE: 8th JANUARY 2007

Digby Wells and Associates
Private Bag x10046
Randburg, 2125
South Africa

Attention: L. H. GRAY

RE: REVISED TERMS OF REFERENCE AND SCOPING REPORT FOR MMAMABULA POWER PROJECT-MINE, POWER PLANT AND POWER TRANSMISSION LINE

1. Reference is made to the revised Terms of Reference and Scoping Report for the above project that you submitted to us for review.

2. We have perused through the submitted documents and consider the issues raised on the draft report to be adequately addressed. We therefore approve the submitted Terms of Reference and the Scoping report.

3. The approval of the submitted Terms of Reference is however subject to the following conditions:
   - A report of the results of the second round of Public Participation Process should be submitted to Department of Environmental Affairs for records.
   - The main issues arising from the Second round of the Public Participation Process should be incorporated into the Terms of Reference to guide the detailed EIA study.

4. You are therefore authorized to proceed with the detailed Environmental Impact Assessment study.

Yours faithfully

G. Mathope/ For Director

An Environment Conscious and Friendly Nation.
RE: DEA/BOD 7/9 XVII 5TH JUNE 2006

CIC Energy Corp
P.O.Box 78938
Sandton 2146
South Africa

Attention: F. Badenhorst & A. Taljaard

RE: REVIEWED PRELIMINARY ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED MMAMABULA ENERGY PROJECT

1. Reference is made to the Preliminary Environmental Impact Assessment Report that you submitted to us for a review.

2. We have reviewed the report and consider the implementation of the project will require undertaking a detailed Environmental Impact Assessment.

3. Find attached herewith the Draft guidelines for preparing the Terms of Reference (ToR) to guide the EIA study. The Terms of Reference should be submitted to The Department of Environmental Affairs for review and approval before the commencement of the detailed EIA study.

Thank you

Yours faithfully

G. Mathope/ for Director

An Environment Conscious and Friendly Nation.
APPENDIX D

LEGAL REPORT
MMAMABULA ENERGY PROJECT
TRANSMISSION LINES
ENVIRONMENTAL IMPACT ASSESSMENT
ENVIRONMENTAL LEGAL FRAMEWORK

JANUARY 2007

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No. 5 More Lion Building, 339 Pretoria Avenue, Rondebosch

Tel: +27 (11) 869 6268
Mobile: +27 82 332 7717

web: ecodaw.co.za
e-mail: lucy@ecodaw.co.za
Project done on behalf of

DIGBY WELLS AND ASSOCIATES

MMAMABULA ENERGY PROJECT
TRANSMISSION LINES

ENVIRONMENTAL IMPACT ASSESSMENT

ENVIRONMENTAL LEGAL FRAMEWORK

ECOLAW
Lucy Koeslag (B.A., LL.B., M.A.)

JANUARY 2007
EXECUTIVE SUMMARY

The Mmamabula Energy Project (MEP) includes the construction and operation of a coal mine and a coal-fired power station at Mmamabula in Botswana and is subject to a separate EIA process and EIS which is due to be submitted to the DEA in the first quarter of 2007. A prerequisite for the operation of the MEP power plant is a transmission network, with which to transport the generated electricity. The construction of transmission lines is therefore critical to the MEP. This report identifies and summarises the various legislative, regulatory and convention requirements applicable to the MEP Transmission Lines.

Botswana has seen significant changes to the environmental legislative and administrative frameworks within the last few years culminating in the promulgation of the Environmental Impact Assessment Act 6 of 2005, and the creation of the Ministry of Environment, Wildlife and Tourism (MEWT) with a mandate to coordinate environmental conservation and protection. The Department of Environmental Affairs (DEA) is mandated to implement the Environmental Impact Assessment Act which requires an Environmental Impact Assessment (EIA) to be completed for the project area, and the approval of an Environmental Impact Statement (EIS).

The Monuments and Relics Act (Chapter 59:03) is administered by the Department of National Museums, Monuments and Art Gallery (DNMMAG) and requires the completion of an Archaeological Impact Assessment (AIA). The Archaeological Impact Assessment (AIA) Report must be submitted to the DNMMAG for endorsement before it may be included as a sub-component of the EIA report for submission to the DEA.

This legislative and administrative framework has been developed for the Mmamabula Energy Project (MEP) Transmission line.

The Botswana Power Corporation (BPC) is the project proponent and as such the EIA process is undertaken on behalf of BPC and is carried out in close consultation with the Corporation. A separate Environmental Impact Statement for this component of the project will be submitted to the DEA for approval.

In addition to the EIA authorisation listed above, several additional permits and licenses may be required from several Botswana Government Departments for the successful implementation of the MEP Transmission lines project. These are listed in the table below:

<table>
<thead>
<tr>
<th>MAIN AUTHORISATIONS</th>
<th>LEGISLATIVE PROVISION</th>
<th>GOVERNMENT DEPARTMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Archaeological Impact Assessment Report (AIA)</td>
<td>Monuments and Relics, Chapter 59:03</td>
<td>Department of National, Museums, Monuments and Art Gallery (DNMMAG)</td>
</tr>
<tr>
<td>approval and permits for the disturbance of</td>
<td></td>
<td>Commissioner of</td>
</tr>
<tr>
<td>MAIN AUTHORISATIONS</td>
<td>LEGISLATIVE PROVISION</td>
<td>GOVERNMENT DEPARTMENT</td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>archaeological sites</td>
<td>Monuments and Relics</td>
<td></td>
</tr>
<tr>
<td>Electricity Generation and Supply Licence</td>
<td>Electricity Supply, Chapter 73:01</td>
<td>Ministry of Minerals, Energy &amp; Water Affairs Energy Affairs Division (EAD)</td>
</tr>
<tr>
<td>Acquisition of private land (MEP area)</td>
<td>Negotiations, willing seller willing buyer or expropriation in terms of the Acquisition of Property, Chapter 40:05</td>
<td></td>
</tr>
<tr>
<td>Acquisition of land or rights over land, necessary for the purpose associated with the generation or supply of electricity by a licensee</td>
<td>Electricity Supply, Chapter 73:01 Acquisition of Property, Chapter 40:05</td>
<td>Ministry of Minerals, Energy &amp; Water Resources Energy Affairs Division (EAD)</td>
</tr>
<tr>
<td>Waste Carrier Authorisation for transboundary movement of hazardous waste</td>
<td>Waste Management Act, No 15 of 1998</td>
<td>Director, Department of Waste Management and Pollution Control (DWMPC)</td>
</tr>
<tr>
<td>Road Construction Permits for Roads, Culverts and T-junctions</td>
<td>Road Traffic, Chapter 69:01</td>
<td>Principal Road Engineer, Department of Roads (DR)</td>
</tr>
<tr>
<td>Transportation permits for Bulk Carriers and Abnormal Loads</td>
<td>Road Transport (Permits) Chapter 69:03</td>
<td>Department of Road Transport and Safety (DRTS)</td>
</tr>
<tr>
<td>Authorisations to utilise borrow pits for building and road construction materials should this material be sourced outside of the mining concession area.</td>
<td>Mines and Minerals Act, No 17 of 1999</td>
<td>Department of Mines (DM)</td>
</tr>
</tbody>
</table>
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<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIA</td>
<td>Archaeological Impact Assessment</td>
</tr>
<tr>
<td>AIDS</td>
<td>Acquired Immune Deficiency Syndrome</td>
</tr>
<tr>
<td>AP</td>
<td>Action Plan</td>
</tr>
<tr>
<td>ARV</td>
<td>Anti-Retroviral</td>
</tr>
<tr>
<td>BFS</td>
<td>Bankable Feasibility Study</td>
</tr>
<tr>
<td>BPC</td>
<td>Botswana Power Corporation</td>
</tr>
<tr>
<td>CIC</td>
<td>CIC Energy Corp</td>
</tr>
<tr>
<td>CKGR</td>
<td>Central Kalahari Game Reserve</td>
</tr>
<tr>
<td>DDA</td>
<td>Department of District Administration</td>
</tr>
<tr>
<td>DEA</td>
<td>Department of Environmental Affairs</td>
</tr>
<tr>
<td>DGS</td>
<td>Department of Geological Survey</td>
</tr>
<tr>
<td>DL</td>
<td>Department of Lands</td>
</tr>
<tr>
<td>DLGD</td>
<td>Department of Local Government and Development</td>
</tr>
<tr>
<td>DLSS</td>
<td>Department of Labour and Social Security</td>
</tr>
<tr>
<td>DM</td>
<td>Department of Mines</td>
</tr>
<tr>
<td>DMS</td>
<td>Department of Meteorological Services</td>
</tr>
<tr>
<td>DNMMAG</td>
<td>Department of National Museums, Monuments and Art Gallery</td>
</tr>
<tr>
<td>DoM</td>
<td>Director of Mines</td>
</tr>
<tr>
<td>DR</td>
<td>Department of Roads</td>
</tr>
<tr>
<td>DRTS</td>
<td>Department of Road Transport and Safety</td>
</tr>
<tr>
<td>DSS</td>
<td>Department of Social Services</td>
</tr>
<tr>
<td>DTA</td>
<td>Department of Tribal Administration</td>
</tr>
<tr>
<td>DWA</td>
<td>Department of Water Affairs</td>
</tr>
<tr>
<td>DWMPC</td>
<td>Department of Waste Management and Pollution Control</td>
</tr>
<tr>
<td>EAD</td>
<td>Energy Affairs Division</td>
</tr>
<tr>
<td>EHS</td>
<td>Environmental, Health and Safety</td>
</tr>
<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
</tr>
<tr>
<td>ESIA</td>
<td>Environmental and Social Impact Assessment</td>
</tr>
<tr>
<td>EIS</td>
<td>Environmental Impact Statement</td>
</tr>
<tr>
<td>EMP</td>
<td>Environmental Management Programme</td>
</tr>
<tr>
<td>EPFI</td>
<td>Equator Principles Financial Institution</td>
</tr>
<tr>
<td>GHG</td>
<td>Greenhouse Gas</td>
</tr>
<tr>
<td>HIV</td>
<td>Human Immune Deficiency Virus</td>
</tr>
<tr>
<td>HAZOP</td>
<td>Hazard and Operability Study</td>
</tr>
<tr>
<td>IFC</td>
<td>International Finance Corporation</td>
</tr>
<tr>
<td>MEP</td>
<td>Mmamabula Energy Project</td>
</tr>
<tr>
<td>MP</td>
<td>Management Plan</td>
</tr>
<tr>
<td>MEWT</td>
<td>Ministry of Wildlife and Tourism</td>
</tr>
<tr>
<td>NACA</td>
<td>National AIDS Coordinating Agency</td>
</tr>
<tr>
<td>NCS</td>
<td>National Conservation Strategy</td>
</tr>
<tr>
<td>NCSAB</td>
<td>National Conservation Strategy Advisory Board</td>
</tr>
<tr>
<td>NCSCA</td>
<td>National Conservation Strategy Coordinating Agency</td>
</tr>
<tr>
<td>NDP</td>
<td>National Development Plan</td>
</tr>
<tr>
<td>NSC2.1</td>
<td>North South Carrier</td>
</tr>
<tr>
<td>OHS</td>
<td>Occupational Health and Safety</td>
</tr>
<tr>
<td>OHSMS</td>
<td>Occupational Health and Safety Management System</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>PCDP</td>
<td>Public Consultation and Disclosure Plan</td>
</tr>
<tr>
<td>PEIA</td>
<td>Preliminary Environmental Impact Assessment</td>
</tr>
<tr>
<td>POP</td>
<td>Persistent Organic Pollutant</td>
</tr>
<tr>
<td>PPAH</td>
<td>Pollution Prevention and Abatement Handbook (1 July 1998)</td>
</tr>
<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
</tr>
<tr>
<td>SEATP</td>
<td>Social and Environmental Awareness Training Plan</td>
</tr>
<tr>
<td>SEEMS</td>
<td>Social and Environmental Management System</td>
</tr>
<tr>
<td>SLDP</td>
<td>Social and Labour Development Plan</td>
</tr>
<tr>
<td>VDC</td>
<td>Village Development Committee</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organisation</td>
</tr>
<tr>
<td>WUC</td>
<td>Water Utilities Corporation</td>
</tr>
</tbody>
</table>
ADMINISTRATIVE & REGULATORY FRAMEWORK

1. INTRODUCTION

The Mmamabula Energy Project (MEP) includes the construction and operation of a coal mine and a coal fired power station at Mmamabula in Botswana and is subject to a separate EIA process and EIS which is due to be submitted to the DEA in the first quarter of 2007. A prerequisite for the operation of the MEP power plant is a transmission network, with which to transport the generated electricity. The construction of transmission lines is therefore critical to the MEP.

The transmission network will comprise one 400kV line going north from the power plant to Phokoje, outside Selebi-Phikwe, via Mahalapye and the Moropule sub-station on the outskirts of Palapye. A 400kV line will also run south connecting into the proposed Mosaditshweni sub-station, approximately 60km north of Gaborone. In addition four 400kV lines will run east from the power plant to the South African border. These will be separated, by a minimum of 2km, into two corridors, each containing two lines. There are two route alternatives that will be considered for the corridor to Palapye as well as two alternatives for the route to the South African border. In the latter case, there is a possibility that both alternatives may be utilised.

Host country laws of Botswana relevant to the successful implementation of all components of the project are considered during the EIA process and all necessary licensing and permitting requirements have been identified in light of current available project information. Permits and authorisation must be obtained timeously to avoid project delays.

This report identifies and summarises the various legislative and regulatory requirements applicable to the MEP Transmission Lines.
2. BOTSWANA ADMINISTRATIVE AND LEGISLATIVE FRAMEWORK

2.1. Administrative Framework

The Republic of Botswana (Botswana) is a landlocked country, covering an area of 581,730 km$^2$. The country is bordered by South Africa to the south and south east, Namibia to the west, Zambia to the north, and Zimbabwe to the northeast. Botswana attained independence on 30 September 1966 as a constitutional democracy. Legislative power lies with the National Assembly.

The dominant ethnic/cultural group in Botswana is the Tswana comprising approximately 80% of the population. They are followed by smaller groups such as the Kalanga, Kgalagadi, Himbukush, Herero, Bayeyi, Batwapong, Basubiya, Basarwa, Babira and the Khoi, as well as relatively small numbers of Whites and Asian people. Serving as a ‘second chamber’ to the National Assembly, the House of Chiefs represents the main Tswana subgroups in the country. Its constitutional function is to advise the National Assembly on all draft bills affecting custom and traditions. The House of Chiefs is made up of the hereditary chiefs of Botswana’s eight principal tribes as set out in the Constitution, in addition to four sub chiefs representing those districts/administrative divisions where other tribes are in the majority.
The Chieftainship Chapter 41:01 defines the principal tribes as the Setswana-speaking Bamangwato, Batawana, Bakgatla, Bakwena, Bangwaketse, Bamalete, Barolong and Batlokwa. The associated Tribal Territories Chapter 32:03 define the ethnic territory of these eight groups.

The President of the Republic of Botswana is also the Head of State. The executive power of Botswana is vested in the President. He exercises the powers either directly or through other officers subordinate to him. Botswana Ministries relevant to the project are the Ministry of Environment, Wildlife and Tourism, the Ministry of Health, the Ministry of Labour and Home Affairs, the Ministry of Lands and Housing, the Ministry of Local Government, the Ministry of Mines, Energy and Water Resources, Ministry of Agriculture and the Ministry of Works and Transportation. Each Ministry has the responsibility to coordinate development and operational activities in their particular spheres, to formulate, direct and coordinate the overall national policies and strategies in terms of their respective portfolios, and to ensure the implementation thereof through the various Government Departments established for such purposes.

The following Ministries and related Departments were identified as having bearing on the MEP and are being consulted during the EIA process (Table 1):

**Table 1: Botswana Ministries and Departments**

<table>
<thead>
<tr>
<th>Ministry</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry of Environment, Wildlife and Tourism</td>
<td>Department of Environmental Affairs (DEA)</td>
</tr>
<tr>
<td></td>
<td>Department of Waste Management and Pollution Control (DWMPC)</td>
</tr>
<tr>
<td></td>
<td>Department of Meteorological Services (DMS)</td>
</tr>
<tr>
<td>Ministry of Labour and Home Affairs</td>
<td>Department of Labour and Social Security (DLSS)</td>
</tr>
<tr>
<td></td>
<td>Department of National Museums, Monuments and Art Gallery (DNMMAG)</td>
</tr>
<tr>
<td>Ministry of Health</td>
<td>Department of AIDS Prevention and Care</td>
</tr>
<tr>
<td></td>
<td>Department of Clinical Services</td>
</tr>
<tr>
<td></td>
<td>Department of Public Health</td>
</tr>
<tr>
<td>Ministry of Lands and Housing</td>
<td>Department of Lands (DL)</td>
</tr>
<tr>
<td></td>
<td>Department of Town and Regional Planning (DTRP)</td>
</tr>
<tr>
<td>Ministry of Local Government</td>
<td>Department of Social Services (DSS)</td>
</tr>
<tr>
<td></td>
<td>Department of District Administration (DDA)</td>
</tr>
<tr>
<td></td>
<td>Department of Tribal Administration (DTA)</td>
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<tr>
<td></td>
<td>Department of Local Government and Development (DLGD)</td>
</tr>
</tbody>
</table>
Additional stakeholders involved in the consultation process are listed below:

- Central District Council
- Ngwato Land Board
- Botswana Power Corporation
- Botswana Water Utilities Corporation
- Botswana Telecommunications Corporation

Administratively, Botswana is divided into ten districts; the Central District, Ghanzi, Kgalagadi, Kgotleng, Kweneng, Chobe, North-west, North-east, South-east and the Southern District, as well as five town councils; namely Jwaneng, Selebi-Pikwe, Lobatse, Francistown and Gaborone.

Central Government is represented in the districts by the office of the District Commissioner and assisted by district councillors and development committees. In turn District Councils are represented by Local Authorities consisting of urban and rural local government bodies such as district and town councils. Administrative decentralisation furthermore involves the district and tribal administration centres, including field offices/agencies of government ministries, as well as sub-districts and subordinate land boards.

At the village level, chiefs and headmen collectively form the Tribal Administration, supported by Village Development Committee (VDC), the police service and customary courts. Traditional leaders (dikgosi) fall under the jurisdiction of district commissioners but exercise their authority through the kgotla (customary court and/or village council), which they also preside over. Sub-chiefs and headmen represent the senior chiefs in their specific villages or wards. They are responsible for upholding Tswana custom and traditions, while they are expected to assume a leading role in the planning and implementation of local development programmes.

The MEP is located in the Mahalapye Sub-District of the Central District of Botswana. Villages potentially affected by the proposed transmission lines are Mmaphashalala, Mookane, Bonwapitse, Dibete, Mosomane, Dinokwe, Mahalapye, Lose, Tewane, Radisele, Palapye, Dikabeya and Tamasane.
2.2. Legislative Framework

The Botswana Constitution Ch: 1 does not include a constitutional provision relevant to environmental or conservation matters. There is also at present no comprehensive or consolidated environmental statute applicable to Botswana, and pollution prevention and environmental management is found in a variety of laws, and administered by several government departments. Institutional reforms within Government have, however, culminated in the creation of the Ministry of Environment, Wildlife and Tourism (MEWT) with a mandate to coordinate environmental conservation and protection. A rationalization of all environment-related functions transferred to MEWT should lead to a clearer identification of the core functions of the Ministry.

The Department of Environmental Affairs (DEA) has been mandated with the implementation of the Environmental Impact Assessment Act 6 of 2005. Since specific regulations and final guidelines have not yet been promulgated in order to assist consultants and project proponents in the implementation of the requirements of the EIA Act, regular consultation with the DEA is necessary to ensure Departmental requirements are being met during the EIA process.

The concepts of sustainable development and the efficient, fair and sustainable usage of natural resources are accepted in the Botswana Government’s National Development Plan or NDP 9 (2003) and the National Policy of Natural Resource Conservation and Development (1990). Sustainable development requires that the exploitation of natural resources for present generations should not compromise the needs of future generations.

It is in light of the overarching principles of sustainable development that the MEP Transmission lines should be approached. The main social and environmental legislation pertinent to the MEP includes the following:

- Acquisition of Property: Chapter 40:05
- Botswana Power Corporation: Chapter 74:01
- Constitution of Botswana Chapter 1
- Electricity Supply Chapter 73:01
- Environmental Impact Assessment Act 6 of 2005
- Herbage Preservation Chapter 38:02
- Monuments and Relics Act 2001
- Public Safety Chapter 22:03
- Road Traffic Chapter 69:01
- Road Transport (Permits) Chapter 69:03
- State Land Chapter 32:01
- Tribal Land Chapter 32:02
- Waste Management Act 15 of 1998

A summary of the main environmental permitting and licensing requirements relevant to the MEP Transmission Lines are provided in the table below:
Table 2: Permits, Licenses and Authorisation Requirements relevant to the MEP Transmission Lines.

<table>
<thead>
<tr>
<th>MAIN AUTHORISATIONS</th>
<th>LEGISLATIVE PROVISION</th>
<th>GOVERNMENT DEPARTMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Archaeological Impact Assessment Report (AIA) approval and permits for the disturbance of archaeological sites</td>
<td>Monuments and Relics, Chapter 59:03</td>
<td>Department of National, Museums, Monuments and Art Gallery (DNMMAG) Commissioner of Monuments and Relics</td>
</tr>
<tr>
<td>Electricity Generation and Supply Licence</td>
<td>Electricity Supply, Chapter 73:01</td>
<td>Ministry of Minerals, Energy &amp; Water Affairs Energy Affairs Division (EAD)</td>
</tr>
<tr>
<td>Acquisition of private land (MEP area)</td>
<td>Negotiations, willing seller willing buyer or expropriation in terms of the Acquisition of Property, Chapter 40:05</td>
<td></td>
</tr>
<tr>
<td>Acquisition of land or rights over land, necessary for the purpose associated with the generation or supply of electricity by a licensee</td>
<td>Electricity Supply, Chapter 73:01, Acquisition of Property, Chapter 40:05</td>
<td>Ministry of Minerals, Energy &amp; Water Resources Energy Affairs Division (EAD)</td>
</tr>
<tr>
<td>Waste Carrier Authorisation for transboundary movement of hazardous waste</td>
<td>Waste Management Act, No 15 of 1998</td>
<td>Director, Department of Waste Management and Pollution Control (DWMPC)</td>
</tr>
<tr>
<td>Road Construction Permits for Roads, Culverts and T-junctions</td>
<td>Road Traffic, Chapter 69:01</td>
<td>Principal Road Engineer, Department of Roads (DR)</td>
</tr>
<tr>
<td>Transportation permits for Bulk Carriers and Abnormal Loads</td>
<td>Road Transport (Permits) Chapter 69:03</td>
<td>Department of Road Transport and Safety (DRTS)</td>
</tr>
<tr>
<td>Authorisations to utilise borrow pits for building and road construction materials should this material be sourced outside of the mining concession area.</td>
<td>Mines and Minerals Act, No 17 of 1999</td>
<td>Department of Mines (DM)</td>
</tr>
</tbody>
</table>

It is important to ensure through the authorisation and application process that all procedural requirements are carefully adhered to and a very thorough public consultation process needs to be conducted to avoid challenges from I&APs on procedural grounds. The consultation strategy must at a minimum include the requirements for consultation as set out in the EIA Act.

2.3. Permitting, Licensing and Authorisation Requirements

2.3.1. Environmental Impact Assessment and Environmental Management Plan in terms of the Environmental Impact Assessment Act 6 of 2005

The Environmental Impact Assessment Act No 6 of 2005 came into operation on the 27th of May 2005 and governs Environmental Impact Assessments (EIAs) to
be undertaken to assess the potential effects of planned development activities on the environment.

The MEP has followed the procedural requirements relevant to the submission of the PEIA, the Terms of Reference and Scoping Document, conducted a comprehensive Environmental Impact Assessment and Public Participation Process and the final submission of the EIS and EMP for approval by the Department of Environmental Affairs.

The EIS and EMP were drafted in accordance with the requirements of Section 10(1) which requires that the statement must be made in the prescribed form and must include the following:

- the applicants name;
- a description of the proposed activity and its purpose;
- an outline of alternative sites of the proposed activity including the non-action alternative
- a description of the likely environmental impact on local environment and socio-economic consequences;
- an Environmental Management Plan;
- the time period for which environmental impact is predicted;
- an account of the predicted environmental impact and an assessment of each kind of environmental impact;
- a discussion of the distribution of the expected environmental impact;
- a description of mitigating measures to limit adverse environmental impact to a minimum;
- a description of residual environmental impact;
- a proposed monitoring programme and evaluation exercise;
- the potential uses to be prevented or impaired by the proposed activity;
- the possible effects of an environmental impact of an activity;
- the potential trans-boundary environmental impact of an activity;
- a brief, non-technical or executive summary;
- such other relevant information as the Minister may consider necessary.

In terms of section 14 (1)(a), once the Department has completed the review of the statement, and is satisfied that the statement adequately identifies the environmental impact likely to be caused and the prescribed mitigation measures in the statement to avert or minimise the potential adverse environmental impact are effective and adequate, it must grant authorisation to the developer on the terms and conditions the Department considers necessary.

Section 14(4) provides that the competent authority may, when issuing an authorisation, prescribe in writing, specific requirements by the technical department, local authorities and the developer for monitoring during and after implementation of the proposed activity.

Environmental authorisations granted by the DEA are valid for the period stipulated in such authorisation and may be subject to renewal at the end of such period.
Part V of the Act deals with post environmental impact assessment of implemented activities and provides that the relevant technical department or local authority must, during and after implementation of an activity, monitor the implementation thereof to determine compliance with the agreed mitigation measures.

In terms of section 20(2), the developer is required to submit an evaluation report to the relevant technical department or local authority at intervals determined by the technical department or local authority.

The Department may, in addition, at its own expense conduct environmental audits twice a year for approval and operational purposes. After the completion of an environmental audit the Department may require a developer to implement:

- specific mitigation measures to ensure compliance with predictions made in the statement; or
- mitigation measures to address environmental impacts not anticipated at the time the authorisation was issued.

2.3.2. Power Generation Licence

The establishment of a power plant as part of the MEP must be considered in light of broader energy planning and policies on national and regional scale as well as international developments in the energy sector.

The Energy Affairs Division (EAD) was established in 1984 under the Ministry of Minerals, Energy and Water Resources (MMEWR). The Division’s portfolio is to direct, co-ordinate, and formulate the national energy policy and related issues. The Botswana Power Cooperation (BPC), is a parastatal under MMEWR, and is responsible for generation and transmission of electricity.

National energy policy objectives for Botswana can be found in the following main policy documents:
- National energy policy objectives as spelled out in the National Development Plan 9 and Vision 2016;
- Botswana Energy Master Plan (BEMP, 2004) and
- Botswana National Energy Policy.

At the regional and international level the following issues will be of importance in the consideration of the establishment of a thermal power plant in Botswana:
- Botswana’s current energy cooperation arrangements in the SADC (Energy protocol and Southern African Power Pool (SAPP);
- International cooperation on combating global warming and climate change;
- The international drive for sustainable energy development and environmental management;
- Aggressive global promotion of renewable sources of energy; and
• General movement from coal to natural gas for power generation and adoption of clean coal technologies.

The National Energy Policy aims at providing a least cost mix of energy supply, which reflects total life cycle costs and externalities, such as environmental damage. The energy policy objectives are mainly that:

• energy users should have access to appropriate and affordable energy services;
• energy should be used efficiently;
• the energy supply industry should be economically sustainable and efficient;
• all users should have security in their access to energy;
• energy extraction, production, transport and use should not damage the environment or people’s health and safety.

In the long term sustainable energy usage needs to be implemented. The EAD is tasked in meeting efficiently and effectively the national energy policy objectives. The EAD acknowledges that Botswana has vast deposits of coal (total coal resources stand at 212 billion tonnes of which 7.2 billion tonnes are measured reserves.) and is challenged to put this abundant locally available resource to use to save foreign exchange.

In doing so the EAD is focussing on clean coal technologies and in light of the global concern about climatic change issues, the EAD is also promoting coal treatment to improve efficiency and heat content per unit/mass and to reduce environmental impacts.

The Electricity Supply Act (Chapter 73:01) makes provision for the licensing and control of undertakings for the generation and supply of electricity. A licence is required to use, work or operate any plant, apparatus or works designed for the supply or use of electricity.

In terms of the Electricity Supply Regulations (Part II regulation 4) an application for a licence must be made to the Minister in writing giving the information called for in the First Schedule and such other information as he may require.

First Schedule Particulars to be supplied in an application for a licence for the generation or supply of electricity includes:

• Name and address and appointment of applicant;
• Location of the generating station and particulars of the generating plant, with site rating and fuel to be used;
• Type of current, frequency and voltage of the energy to be generated;
• Use to which energy generated will be principally used;
• Estimated maximum loading on the generating plant and number of units to be generated each year;
• Estimated capital expenditure on generation works;
• The qualifications of operating staff.
Before issuing an electricity supply licence the Minister must consult with BPC and must take into consideration the existing and future plans of the Corporation with regard to the generation and supply of electricity for Botswana, giving precedence to the interests of the Corporation. It is therefore necessary to ensure that the BPC is consulted at a very early stage in the Project to provide background to the project and to gauge their future plans, support and guidance for the project.

2.3.3. Acquisition of Surface Rights

2.3.3.1. Acquisition of Land for Electricity Purposes in Botswana

The Electricity Supply Act (Chapter 73:01) makes provision for the licensing and control of undertakings for the generation and supply of electricity. A licence is required to use, work or operate any plant, apparatus or works designed for the supply or use of electricity.

A licensee may place any transmission line above or below ground across any land provided that the licensee serves on the owner of the land and on any person lawfully occupying it, notice of intention, together with the description of the lines proposed to be placed.

The Act makes provision for the President to acquire in accordance with the Acquisition of Property Act, so much land or rights over land, as he may consider necessary for the purpose associated with the generation or supply of electricity by a licensee, which purpose must be deemed to be a public purpose.

Before acquiring land in terms of the Acquisition of Property Act, the President must be satisfied that the licensee concerned has taken all reasonable steps to acquire on reasonable terms, by agreement with the owner, the land which he wishes to use and has been unable to do so and that the acquisition of the land is necessary for the purposes of the undertaking carried on by the licensee concerned.

2.3.4. Archaeological Impact Assessment and Permits

In terms of the Monuments and Relics Act 21 of 2001 section 19(2) both an archaeological pre-development impact assessment and an environmental impact assessment study must be undertaken by any person wishing to undertake a major development such as construction or excavation, for the purposes of mineral exploration and prospecting, mining, laying of pipelines, construction of roads and dams, or erection of any other structure, which will physically disturb the earth’s surface.

For the purposes of this Act a “pre-development archaeological impact assessment” means:
(a) the study, by an archaeologist, of an area in which development or any ground disturbing activity is to be carried out, to determine the likelihood of the development or activity impacting negatively on any cultural material or evidence that may be present in the area to be disturbed.; and

(b) any recommendation made by the archaeologist on how to prevent or mitigate any negative impact on the cultural material or evidence referred to above.

The Archaeologist engaged by the consultant to undertake an Archaeological Impact Assessment (AIA) must be a Botswana citizen and must be registered with the Department of National, Museums, Monuments and Art Gallery (DNMMAG) before he or she may commence with an AIA. The archaeologist is required to utilise the methods approved by the Department of National, Museums, Monuments and Art Gallery (DNMMAG) in undertaking the assessment and to liaise with the DNMMAG. The Archaeological Impact Assessment Report (2 copies) and the written application for a Development Permit must be submitted to the Commissioner of Monuments and Relics for approval at the National Museum. Written permission of the Commissioner is required before development may commence and conditions attached must be complied with. The Commissioner will decide whether or not to accept the mitigation recommendations and may either issue a Development Permit, with mitigation requirements as conditions, or may require that the mitigation be carried out prior to issuing a Development Permit. Only once approved by DNMMAG should the report be submitted as a sub-component of the EIA report for submission to the DEA.

CIC will have the option to preserve the sites if they are located outside the areas of actual impact, or to fence the sites and divert development around them. No site may be disturbed without an Impact Permit for that site. CIC will be responsible for the preservation or mitigation of the sites and will need to make sure that contractors and sub-contractors are also made aware of this.

2.3.5. Registration of Immobile and Mobile Treatment Plants and Waste Storage Areas

No person is permitted to operate a waste disposal site unless the waste disposal site is registered in terms of section 14 of the Waste Management Act or unless an exemption has been obtained from the Minister in terms of section 14(6).

Mobile or immobile waste treatment plant and temporary waste storage areas and waste transfer stations must also be registered. This will include any incinerators, scrap and salvage yards and waste telecon or waste skip areas, including sewage treatment plants.

2.3.6. Road Construction & Transport Permits

No movement of controlled waste within Botswana, or the trans-boundary movement thereof, may take place unless by a waste carrier licence issued in
terms of the Waste Management Act or if exempted by the Minister in terms of s13(12) of the Act.

No licensing is required for carriers who transport controlled waste between different places on the same premises.

The construction of culverts and T-junctions and the designs of the access roads must be permitted by the Department of Transport in terms of the Road Traffic Act. A sixty one metre road reserve measured from the centre of the road to comprise 30.5 meters on both sides of the road is required. Botswana Road Design Manual and Botswana Road Specification Document should be used as reference documents when designing the access road. A slip way and holding lanes should be included in the design. The designs must be sent to the Department of Roads for approval.

The movement of bulk carriers and abnormal loads within the jurisdiction of Botswana must be conducted in accordance with a transportation permit provided by the Department of Road Transport and Safety.

2.3.7. Borrow pits

The holder of a mineral concession in terms of section 58 of the Mines and Minerals Act 17 of 1999 is provided special rights with regard to the exploitation of industrial minerals. The holder is authorized to mine industrial minerals without a minerals permit provided it is within the mining lease area and the minerals are used solely for building, road making or agricultural purposes.

Industrial minerals include barite, basalt, clay, dolomite, feldspar, granite, gravel, gypsum, laterite, limestone, mica, magnetite, marble, phosphate, rock, sand, sandstone, slate and talc, when used for agricultural, building, road making or industrial purposes.

The Act provides further that should the holder exercise his rights under this section, the creation of the borrow pits must be done in such a manner as to minimize environmental damage and the pits must be rehabilitated, within a reasonable time, to the reasonable satisfaction of the Director of Mines. Therefore, the Environmental Impact Assessment study and associated EMP must include mitigatory measures and closure requirements relevant to the borrow pits.

Should excavation and backfilling material be sourced from borrow pits outside of the mining concession area a mining licence will be required from the Department of Mines in terms of section 37 of the Mines and Minerals Act 17 of 1999. A separate Environmental Impact Assessment study and the compilation of an Environmental Management Programme must be submitted together with the mining licence application.

2.4. Central Government Social and Environmental Policy Development

The last decade has seen extensive policy and legislative reforms as well as institutional and planning interventions aimed at promoting sustainable
development, reducing environmental degradation, increasing efficiency in natural resource utilisation and reducing poverty, especially in rural areas.

The National Strategy on Natural Resources Conservation and Development, also known as the NCS, was adopted in 1990. The Strategy has the twin objectives of increasing the effectiveness of natural resources use and management to maximise the benefits and minimise undesirable side effects; and of integrating environmental work and considerations throughout the operations of all Ministries. To oversee the implementation of the Strategy, and to coordinate the various environment and natural resources institutions of Government, the National Conservation Strategy Advisory Board (NCSAB), was established, with the National Conservation Strategy Coordinating Agency (NCSA) as its Secretariat.

In 1997, Vision 2016 outlined the Government’s development initiatives and recognized the need to address environmental issues in order to achieve sustainable development. In line with the pillar “A Prosperous, Productive and Innovative Nation”, the Vision advocates for sustainable economic growth and development which takes into consideration efficient use of both renewable and non-renewable resources, equitable distribution of assets, community participation in natural resources management, poverty eradication, and minimum land, water and air pollution.

National Development Plan 9 (NDP-9) covers the period April 2003 to March 2009 and is subtitled: Towards Realisation of Vision 2016: Sustainable and Diversified Development through Competitiveness in Global Markets. The fundamental underlying policy objectives of the NDP-9 include economic diversification, employment creation, rural development, poverty alleviation, environmental protection, and the fight against HIV/AIDS.

Accordingly, several policies and strategies have been implemented since the approval of NDP 9. Botswana’s National Health Policy emphasizes primary health care and sustainable health service provision. The National AIDS Coordinating Agency (NACA) is responsible for facilitating and coordinating country-wide HIV/AIDS interventions, such as the provision of Anti-Retroviral (ARV) therapy, support to orphans and home-based care programmes. Under ‘Gender and Development’ NDP-9 prioritises the implementation of the National Gender Programme and the active mainstreaming of gender issues into all formal HIV/AIDS interventions. The Government’s response to HIV/AIDS is enshrined in the National HIV/AIDS Policy and National HIV/AIDS Strategic Plan for 2003-2009. Both documents highlight the multi-sectoral nature of the response, facilitating the participation of people living with HIV/AIDS.

The NDP-9 is committed to strengthening the current land management system through amongst others (a) improving the operations of the Land Boards, (b) undertaking water point surveys and groundwater resource assessment studies, (c) reviewing past land use plans, and (d) preparing Integrated Land Use Plans for remaining districts. Challenges relating to land administration and land
management are being addressed through the broadening of the scope of the Land Tribunal by extending its jurisdiction to appeals emanating from Planning Boards and Land Boards. Full implementation of the State and Tribal Land Management Information System is currently in progress.

Of particular importance for the current study is the undertaking in the NDP-9 to integrate fully environmental issues into national development policies and programmes, supported by appropriate legislation and institutional reform to enforce such legislation. The promulgation of the Environmental Impact Assessment Act during the first half of 2005 may serve as an example of this integrative approach. Mr Kitso Mokaila, the Minister of Environment, Wildlife and Tourism in addressing senior government officials at a breakfast seminar on the 2nd of May 2006 reiterated that non compliance with the Environmental Impact Assessment Act is not an option and that the Ministry would support the Director of the Department of Environmental Affairs in applying the law (The Reporter, 3 May 2006).

The government has developed over twenty-five separate laws related to environmental and resource management issues as well as many national policies, some of which are listed below.

- **Wildlife Conservation Policy (1986):** Allows for the management and utilization of wildlife resources.
- **Energy Policy (draft):** The policy aims to lessen deforestation caused by fuel-wood collection, and ensure that all households and community services have access to adequate and affordable energy services.
- **Agriculture Policy (1991):** Seeks to utilize the country's land resources, both grazing and arable, without long-term damage to the environment.
- **Indigenous Livestock Species Policy (draft):** Ensures the conservation of indigenous livestock species to achieve food security and to guarantee a future supply of animal products and biodiversity in Botswana.
- **Plant Genetic Resources Policy (draft):** Formulated after the realization that sundry varieties of crops are being replaced by modern cultivars, which are often less diverse. Supports institutions concerned with agro-diversity with the objective to conserve and maintain the diversity of plant genetic resources material through in situ and ex situ conservation.
- **Tourism Policy (draft):** Promotes low-volume, high-value tourism in Botswana aimed at a market of middle- to high-income patrons. Ensures relatively fewer disturbances to the natural environment with less tourist traffic.
- **Water Master Plan (1992):** A set of plans arising from the extensive analysis options for the development and management of water resources of Botswana until 2020. The plans not only outline the basic physical and engineering developments, but also take into account economic, social, environmental, institutional and legal factors.
- **Wetlands Policy (draft):** To promote the conservation of Botswana's wetlands in order to sustain their ecological and socio-economic functions and benefits for the present and future well being of the people.
• Forestry Policy (draft): Will support (1) the development of sustainable forest management options based on sound ecological principles, (2) domestication and commercialization of forest products such as fruits and medicines and (3) restoration of degraded land using afforestation and plantations to make the land reusable.
3. INTERNATIONAL SOCIO-ENVIRONMENTAL REGULATIONS AND GUIDELINES

3.1. Equator Principles

Project financing of the Mmamabula Energy Project (MEP) will be sourced from Financial Institutions that subscribe to the Equator Principles and are appropriately termed Equator Principles Financial Institutions (EPFI). This requires that CIC Energy Corporation (CIC) demonstrate that the company has identified all potential environmental, social and health impacts associated with the project and that these will be managed and monitored in accordance with the Equator Principles (July, 2006).

The Equator Principles are a set of voluntary guidelines which a number of financial institutions have adopted with the intention of creating an industry standard for assessing and managing environmental and social issues in the project finance sector.

The Equator Principles are based on the policies and guidelines of the International Finance Corporation (IFC) which is the private sector development arm of the World Bank. The MEP EIA must therefore comply with the following requirements:

• Applicable IFC environmental, social and disclosure policies;
• World Bank Group environmental, health and safety guidelines which are contained in the World Bank Pollution Prevention and Abatement Handbook (PPAH);
• IFC Safeguard Policies for environmental and social issues; as well as
• Sectoral guidelines (environmental, health and safety guidelines specific to particular industries, sectors, or types of projects) and
• Host country laws, regulations and permits required by the project.

3.1.1. Principle 1: Review and Categorisation

When a project is proposed for financing, the relevant Equator Principles Financial Institution (EPFI) will, as part of its internal social and environmental review and due diligence, categorise such project based on the magnitude of its potential impacts and risks in accordance with the environmental and social screening criteria of the IFC (Exhibit I).

Proposed projects may be categorised as one of the following:

Category A
Projects with potential significant adverse social or environmental impacts that is diverse, irreversible or unprecedented;

Category B
Projects with potential limited adverse social or environmental impacts that are few in number, generally site-specific, largely
reversible and readily addressed through mitigation measures; and

Category C Projects with minimal or no social or environmental impacts.

The MEP falls within a Category A project and all commitments relevant to Category A projects as set out in principles 2 throughout 10 must be complied with.

3.1.2. Principle 2: Social and Environmental Assessment

An Environmental and Social Impact Assessment (ESIA) process is been undertaken to address the relevant social and environmental impacts and risks of the Mmamabula Energy Project as part of the Bankable Feasibility Study (BFS). The ESIA will include all relevant issues included in Exhibit II of the Equator Principles. The ESIA will also propose mitigation and management measures relevant and appropriate to the nature and scale of the proposed project.

3.1.3. Principle 3: Applicable Social and Environmental Standards

The MEP ESIA will make reference to and comply with the applicable IFC Performance Standards and the applicable Industry Specific EHS Guidelines (“EHS Guidelines”).

The relevant IFC Performance Standards are:
- Performance Standard 1: Social and Environmental Assessment and Management System
- 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

The relevant World Bank Guidelines contained in the Pollution Prevention and Abatement Handbook (PPAH, 1998) are:
- Coal Mining and Production
- Thermal Power Guidelines for New Plants
- Mining and Milling – Underground (Not contained in the PPAH and currently in use).

The relevant IFC Guidelines, 1991-2003 ([www.ifc.org/enviro](http://www.ifc.org/enviro)) are:
- Electric Power Transmission and Distribution
- Hazardous Materials Management
- Life and Fire Security
- Occupational Health and Safety
• Roads and Highways

The ESIA will establish the project's overall compliance with, or justified deviation from, the respective Performance Standards and EHS Guidelines.

The ESIA will address compliance with relevant host country laws, regulations and permits that are applicable to social and environmental aspects of the Mmamabula Energy Project.

3.1.4. Principle 4: Action Plan and Management System

Outcomes of the ESIA will be the development of Management Plans and Action Plan (AP) which addresses the relevant findings, and draws on the conclusions of the Assessment. The AP will describe and prioritise the actions needed to implement mitigation measures, corrective actions and monitoring measures necessary to manage the impacts and risks identified in the Assessment.

The developer will establish a Social and Environmental Management System (SEMS) that addresses the management of these impacts, risks, and corrective actions required to comply with applicable host country social and environmental laws and regulations, and requirements of the applicable Performance Standards and EHS Guidelines, as defined in the AP.

3.1.5. Principle 5: Consultation and Disclosure

Consultations with project affected communities by the government, the developer or third party expert will be undertaken in a structured and culturally appropriate manner. The public participation process will ensure that project affected communities are provided free, prior and informed consultation and will facilitate their informed participation as a means to establish, to the satisfaction of the EPFI, whether a project has adequately incorporated affected communities’ concerns.

In order to accomplish this, the ESIA documentation and AP, or non-technical summaries thereof, will be made available to the public by the developer for a reasonable minimum period in the relevant local language and in a culturally appropriate manner. The results of the public participation process will be documented; including any actions agreed resulting from the consultations. Disclosure will occur early in the EIA process, before the project construction commences, and on an ongoing basis.

3.1.6. Principle 6: Grievance Mechanism

To ensure that consultation, disclosure and community engagement continues throughout construction and operation of the project, the developer will establish a grievance mechanism as part of the Social and Environmental Management System (SEMS) which will be scaled to the risks and adverse impacts of the
project. This will allow the developer to receive and facilitate resolution of concerns and grievances about the project’s social and environmental performance raised by individuals or groups from among project-affected communities.

The developer will inform the affected communities about the mechanism in the course of its community engagement process and ensure that the mechanism addresses concerns promptly and transparently, in a culturally appropriate manner, and is readily accessible to all segments of the affected communities.

3.1.7. Principle 7: Independent Review

The MEP ESIA and consultation process documentation will be reviewed by an independent social or environmental expert not directly associated with the developer, in order to assist EPFI’s due diligence, and assess Equator Principles compliance.

3.1.8. Principle 8: Covenants

The following covenants will be included in the financing documentation:

a) to comply with all relevant host country social and environmental laws, regulations and permits in all material respects;

b) to comply with the AP (where applicable) during the construction and operation of the project in all material respects;

c) to provide periodic reports in a format agreed with EPFIs (with the frequency of these reports proportionate to the severity of impacts, or as required by law, but not less than annually), prepared by in-house staff or third party experts, that

i) document compliance with the AP (where applicable), and

ii) provide representation of compliance with relevant local, state and host country social and environmental laws, regulations and permits; and

d) to decommission the facilities, where applicable and appropriate, in accordance with an agreed decommissioning plan.

Where a borrower is not in compliance with its social and environmental covenants, EPFIs will work with the borrower to bring it back into compliance to the extent feasible, and if the borrower fails to re-establish compliance within an agreed grace period, EPFIs reserve the right to exercise remedies, as they consider appropriate.

3.1.9. Principle 9: Independent Monitoring and Reporting

To ensure ongoing monitoring and reporting over the life of the loan, EPFIs will require the 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.
3.1.10. 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.

3.2. IFC Performance Standards

The International Finance Corporation (IFC) has launched a new set of business standards for managing environmental and social risks for project finance. The IFC Performance Standards comprise a collection of eight quality standards which the developer is required to meet throughout the life of an investment by the financial institution. These Performance Standards include the following:

- Performance Standard 1: Social and Environmental Assessment and Management System
- 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

Of particular importance is the introduction of Performance Standard 1, the Social and Environmental Management System, which requires the project proponent not only to assess the social and environmental impacts of the proposed project but in addition ensure the continued management of social and environmental performance throughout the lifecycle of the project. CIC is committed to the establishment and maintenance of a Social and Environmental Management System (SEMS) which will incorporate management responsibilities for social and environmental aspects, engagement with workers and local communities, local government and regulators and put in place procedures for long-term monitoring and reporting on the effectiveness of the risk management measures.

Performance Standards 2 through 8 establish requirements to avoid, reduce, mitigate and compensation for impacts on people and the environment and to improve conditions where appropriate.

3.3. World Bank Pollution Prevention and Abatement Handbook

The World Bank has published guidelines for air emissions, waste water discharge and noise standards relevant to thermal power projects, mining projects and general environmental guidelines. These guidelines are published in the World Bank’s Pollution Prevention Abatement Handbook (1998).
The MEP will be governed by the strictest environmental numerical standards relevant to air pollution, potable water quality, effluent discharges, and noise emissions. A Numerical Guidelines Manual has been compiled to assist the project team in applying relevant numerical guidelines in the design, construction and operational phases of the MEP.
4. CONCLUSION

Botswana has seen significant changes to the environmental legislative and administrative frameworks within the last few years culminating in the promulgation of the Environmental Impact Assessment Act 6 of 2005 and the creation of the Ministry of Environment, Wildlife and Tourism (MEWT) with a mandate to coordinate environmental conservation and protection. The Department of Environmental Affairs (DEA) is mandated to implement the Environmental Impact Assessment Act which requires an Environmental Impact Assessment (EIA) and the approval of the Environmental Impact Statement (EIS), while the Department of Mines (DM) is mandated to implement the Mines and Minerals Act 17 of 1999 in terms of which an Environmental Impact Assessment (EIA) study is required and the approval an Environmental Management Programme (EMP).

Several additional permits and licenses will be required for the successful implementation of the Mmamabula Energy Project. These licenses permits and authorisations must be timeously applied for to ensure that they do not delay the proposed implementation timeframes of the MEP.

Of specific importance to the successful implementation of the project are negotiations with the Ministry of Minerals, Energy and Water Resources in securing an electricity generation and supply licence to use, work or operate the proposed MEP power plant. The BPC must play an integral part of the negotiations and must be informed of all potential changes to the design and outputs of the power plant and associated infrastructure.

The acquisition of private and state owned land will require a dedicated resettlement team to ensure that all processes and procedures in respect of land acquisition, and compensation is done in a just and equitable manner and is not only in accordance with Botswana’s legislative requirements and government policies, but in essence fulfils the requirements of the IFC Performance Standard 5: Land Acquisition and Involuntary Resettlement.
5. REFERENCES

Acquisition of Property: Chapter 40:05

Atmospheric Pollution (Prevention): Chapter 65:03


Botswana Power Corporation: Chapter 74:01

Constitution of Botswana Chapter 1

Electricity Supply Chapter 73:01

Environmental Impact Assessment Act 6 of 2005


IFC Performance Standards
http://www.ifc.org/ifcext/policyreview.nsf/Content/ConsultationDocuments


Mines and Minerals Act 17 of 1999

Mines, Quarries, Works and Machinery Chapter 44:02

Monuments and Relics Act 2001

Road Traffic Chapter 69:01

Road Transport (Permits) Chapter 69:03

Robinson, A.A. August 2005: Focus, Project Finance, The Equator Principles - guidelines for responsible project financing

Town and Country Planning Chapter 32:09

Tribal Land Chapter 32:02

Tribal Territories Chapter 32:03

Waste Management Act 1998

Water Chapter 34:01

Water Utility Corporation Chapter 74:02

World Bank PPAH http://www.ifc.org/ifcext/enviro.nsf/Content/PPAH

6. LIST OF TABLES AND FIGURES

6.1. Table 1: Botswana Ministries and Departments

6.2. Table 2: Permits, Licenses and Authorisation Requirements relevant to the MEP Power Line.

6.3. Figure 1: Outline of the Botswana National Government
INTRODUCTION

CIC Energy Corp is investigating the best route for power transmission from the proposed power station at Mmamabula, to Selebi Phikwe in the north and Mosaditshweni in the south. In addition a transmission line is proposed from Mmamabula to join up with the Eskom power grid at Matimba in South Africa.

Digby Wells and Associates (DWA) were appointed to conduct the environmental studies required to ascertain the impacts of the proposed transmission line project on the area affected and the people living there.

Envirosoil Consulting conducted a desktop soil study on the areas to be affected by the construction of transmission lines required to move power generated at the Mmamabula power station to connect to the grid within Botswana as well as to the Eskom grid in South Africa.

The desktop report covers the soil groups which fall immediately below the proposed transmission lines, the general nature an extent of the soils in kilometres, and reviews the impacts anticipated during the construction, and operational phases of the project.

1. METHODOLOGY

The soils were investigated on a regional basis using the Soil Map of Botswana 1 : 1,000,000 scale (Soil Mapping & Advisory Services, 1990) and interpolated according to the soil groups that occupied the proposed route.

Soils were classified according to the FAO-UNESCO-ISRIC (1990) Soil Classification System in order to maintain continuity with the historical soil studies completed in the area as well as complying with World Bank Standards.

A Table was drawn up which follows the route from Mosaditshweni to Selebi Phikwe, covering both East and West options, as well as the route from Mmamabula Power Station to the Limpopo River (where the Botswana/South Africa border is crossed). The soil groups are described as well as general characteristics of the soils which might influence construction.

The information was utilized for conducting an impact assessment of all the aspects of the project which would affect the land surface. Proposals for mitigation and management measures which might reduce the impacts are also presented.
TABLE 1 – GENERAL DESCRIPTION OF SOILS ALONG TRANSMISSION ROUTE

<table>
<thead>
<tr>
<th>DISTANCE (km)</th>
<th>SOIL GROUP</th>
<th>GENERAL SOIL DESCRIPTION</th>
<th>POSSIBLE LIMITATIONS FOR CONSTRUCTION OF TRANSMISSION LINES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start @ Mosaditshweni</td>
<td>Route W Both E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 - 20</td>
<td>1ARI</td>
<td>Deep to very deep, moderately to well drained, yellowish brown to red, fine and fine-medium sands to loamy fine sands</td>
<td>NONE - Deep, well drained</td>
</tr>
<tr>
<td>20 - 25</td>
<td>CLp</td>
<td>Moderately deep, moderately well to well drained, greyish brown to pale brown, fine sandy loams to silt loams.</td>
<td>Calcrete may outcrop in some areas</td>
</tr>
<tr>
<td>25 - 50</td>
<td>ARo, 1ARI</td>
<td>Deep to very deep, moderately well to excessively drained, yellowish brown to dark red, coarse sands to loamy fine sands</td>
<td>NONE – deep, well drained</td>
</tr>
<tr>
<td>50 - 90</td>
<td>LVk, 2LVf</td>
<td>Deep to moderately deep, imperfectly to well drained, dark greyish brown to red, sandy loam to sandy clay loam.</td>
<td>Calcrete outcrops may occur</td>
</tr>
<tr>
<td>90 - 120</td>
<td>ARi</td>
<td>Deep to very deep, moderately to well drained, yellowish brown to red, fine and fine-medium sands to loamy fine sands</td>
<td>NONE - Deep, well drained</td>
</tr>
<tr>
<td>120 - 130</td>
<td>2LVf, *LVx</td>
<td>Moderately deep to very deep, moderately well to slightly excessively drained, strong brown to dark red, sandy loams to clay loams</td>
<td>NONE - Deep, well drained Higher clay content.</td>
</tr>
<tr>
<td>130 - 160</td>
<td>*LVx, LVh</td>
<td>( * see below) Moderately deep to very deep, imperfectly to well drained, very dark grey to yellowish red, sandy loams to clays.</td>
<td>Lixisols highly weathered, less stable than Luvisols</td>
</tr>
<tr>
<td>160 - 205</td>
<td>LVx</td>
<td>Moderately deep to very deep, moderately well to slightly excessively drained, strong brown to dark red, sandy loams to clay loams</td>
<td>NONE – deep, well drained</td>
</tr>
<tr>
<td>105 - 215</td>
<td>ARo, LVk</td>
<td>Deep to very deep, moderately well to excessively drained, yellowish brown to dark red, coarse sands to loamy fine sands Deep to moderately deep, imperfectly to well drained, dark greyish brown to red, sandy clay loams to clays.</td>
<td>NONE - Deep, well drained Calcrete outcrops may occur</td>
</tr>
<tr>
<td>215 - 225</td>
<td>LVf</td>
<td>Moderately deep to very deep, moderately well to slightly excessively drained, strong brown to dark red, sandy loams to clay loams</td>
<td>NONE – deep, well drained</td>
</tr>
<tr>
<td>225 - 275</td>
<td>LXh</td>
<td>Moderately deep to very deep, imperfectly to moderately well drained, dark brown to red, loamy coarse sands to fine sandy loams.</td>
<td>Highly weathered soil, may not be as stable as other soil</td>
</tr>
<tr>
<td>275 – 290 @ Selibe Phikwi</td>
<td>LVh</td>
<td>Moderately deep to very deep, imperfectly to well drained, very dark grey to yellowish red, sandy loams to clays.</td>
<td>NONE - Deep, well drained Higher clay content.</td>
</tr>
<tr>
<td>0 – 25 Mma - RSA</td>
<td>ARo, ARI, LVk</td>
<td>Deep to very deep, moderately well to excessively drained, yellowish brown to dark red, coarse sands to loamy fine sands</td>
<td>NONE - Deep, well drained Calcrete outcrops may occur</td>
</tr>
</tbody>
</table>

* LVx

Higher clay content.
2. GENERAL SOIL DESCRIPTIONS

The following soil groups are described above – **ARl** (Luvic Arenosols), **CLp** (Petric Calcicols) **ARo** (Ferralic Arenosols), **LVk** (Calcic Luvisols), **LVf** (Ferric Luvisols), **LVx** (Chromic Luvisols), **LVh** (Haplic Luvisols), **LXh** (Haplic Lixisols), **LXf** (Ferric Lixisols)

W – Western transmission route
E – Eastern transmission route

The major soil groups that will be crossed by the proposed transmission routes are mostly Arenosols and Luvisols, with small areas of Lixisols. They are mostly found on fine-grained and coarse-grained sedimentary rocks e.g. sandstone. Luvisols have an accumulation of clay (15-25%) and a higher fertility, while Arenosols are coarse, sandy soils with weak structure and low fertility. In general the soils are sandy with a low clay content (<10%); this results in high water infiltration rates, low water holding capacity and fairly poor fertility. Lixisols are highly weathered and strongly leached soils and they also have a zone of clay accumulation which may occur at some depth below soil surface.

3. LAND CAPABILITY

The topography, climate and parent material across the proposed transmission route does not differ much, with the result that the soils and vegetation are fairly homogeneous throughout the area. The vegetation is mostly suitable for grazing of cattle and goats, although areas are frequently cleared and the soil cultivated for the planting of crops such as maize, sorghum, millet and vegetables. This does not necessarily qualify the land capability as being arable as the crops are planted for subsistence and could not be cultivated on an economically sustainable basis. This is because the soils are mostly sandy, with poor structure and extremely low in all essential nutrients especially phosphate. These soils are thus seldom farmed on a large scale, mainly due to the high cost of fertilization.

The entire transmission route should be classified as being veld or grazing land for purposes of its pre-construction land capability.

4. LAND USE

The land use is mostly grazing of goats and cattle as well as subsistence agriculture with a small focus on tourism within the Tuli Block.
5. IMPACT ASSESSMENT

5.1. CONSTRUCTION PHASE

The majority of the impacts on the soil will take place during the construction phase of the project.

During the construction phase of the project, foundations for the pylons will be laid and the steel framework bolted together and put into place. The work carried out will be mainly setting up of service roads, temporary buildings and workshops. This will entail clearing of areas and the disturbance of the topsoil. The topography will also be disturbed and the overall impact will be loss of some topsoil due to minor erosion and possible contamination of the soil by fuel and oils due to general construction activities.

Some soil compaction will be caused by heavy vehicles and machinery, especially in areas where the soil has a higher clay content. The topsoil that will be most affected will be the luvisic and lixisic soils which have a sandy loam to clay loam texture. The arenosols have a sandy to loamy sand topsoil which will be far less susceptible to compaction. The compaction problem will however probably only be for a short period and the impact will be relatively small. In addition, most of the area under the power lines is not under cultivation, and the other vegetation eg. trees and grasses will not be affected to the same degree.

Another impact that needs to be considered is the affect of frequent passes of vehicles over the same area which can cause pulverisation of the topsoil, completely breaking up the structure and resulting in the sand, loamy sand and sandy loam to become like talcum powder. This extremely powdery layer can be problematic as it gets into moving parts, engines and causes abrasion. The fine dust also has a nuisance value and can be blown long distances.

The soil impacts during the construction are assessed below:

<table>
<thead>
<tr>
<th>SIGNIFICANCE</th>
<th>Loss of topsoil</th>
<th>Hydrocarbon spills</th>
<th>Soil compaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact</td>
<td>Minor (negative)</td>
<td>Minor (negative)</td>
<td>Minor(negative)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Terminology</th>
<th>Rating</th>
<th>Rating</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grouping Type</td>
<td>Routine</td>
<td>Routine</td>
<td>Routine</td>
</tr>
<tr>
<td>Type</td>
<td>Direct</td>
<td>Direct</td>
<td>Direct</td>
</tr>
<tr>
<td>Magnitude</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nature</td>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
</tr>
<tr>
<td>Duration</td>
<td>Short term</td>
<td>Short term</td>
<td>Short term</td>
</tr>
<tr>
<td>Scale</td>
<td>Local</td>
<td>Local</td>
<td>Local</td>
</tr>
<tr>
<td>Sensitivity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>of receptor</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Likelihood</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>SIGNIFICANCE</td>
<td>Minor (negative)</td>
<td>Minor (negative)</td>
<td>Minor(negative)</td>
</tr>
</tbody>
</table>

As a result of the impact on the soils as described above, the land capability may be affected negatively, although one would expect that the soil disturbance, contamination and
pollution will be confined to very small areas. Although the land capability in the immediate area of the transmission lines will be reduced it is unlikely that the land capability of the total area will be significantly affected.

As with soil impacts, the impact on land capability will be negative, however the impact will be contained to the transmission line area, and should not lead to a decrease in land capability. There are not expected to be any significant cumulative impacts.

The land capability impact during the construction phase is assessed below:

<table>
<thead>
<tr>
<th>Impact</th>
<th>Reduction in land capability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminology</td>
<td>Rating</td>
</tr>
<tr>
<td>Grouping</td>
<td>Routine</td>
</tr>
<tr>
<td>Type</td>
<td>Direct</td>
</tr>
<tr>
<td>Magnitude</td>
<td></td>
</tr>
<tr>
<td>Nature</td>
<td>Negative</td>
</tr>
<tr>
<td>Duration</td>
<td>Long term</td>
</tr>
<tr>
<td>Scale</td>
<td>Local</td>
</tr>
<tr>
<td>Sensitivity of receptor</td>
<td>Medium</td>
</tr>
<tr>
<td>Likelihood</td>
<td>Medium</td>
</tr>
<tr>
<td>SIGNIFICANCE</td>
<td>Minor (negative)</td>
</tr>
</tbody>
</table>

The construction activities will change the land use significantly in the areas surrounding the pylons, but should not impact to any significant extent on the overall area. Cattle will however still be able to be grazed in the areas close to the transmission lines. Areas may need to be fenced off, however the area lost will be small in proportion to the total area.

5.2. OPERATIONAL PHASE

The operational phase should not cause any impacts to speak of, except for the passing of vehicles on the service road. Provided the roads are maintained, there will be a very small chance of erosion from these roads. Low rainfall and flat terrain also minimises the significance of this impact.

Oil and diesel spills that may take place during the operational phase will not be significant.

5.3. DECOMMISSIONING PHASE

It is unlikely the transmission lines will be decommissioned in the foreseeable future as once the Mmamabula project is terminated it is likely that the transmission lines will remain in place to service the Botswana national grid.
6. MANAGEMENT OF IMPACTS IDENTIFIED

During construction, movement of heavy vehicles around the site should be limited to roads. This will ensure that the compaction will not be widespread, but will be confined to the parking areas, the areas of operation and the roads needed to get between them.

The roads that are frequently used should also be built up using ferricrete or calcrete that can be found in the immediate area of construction. This will prevent pulverisation of the soil, as well as reducing the wear and tear on the vehicles as the road quality will not deteriorate as quickly.

Storage and use of fuels and lubricants should be strictly confined to bunded areas. Areas cleared of topsoil should be kept to the minimum in order to limit the possible erosion problem.

Soil erosion is a potential impact for all sloping areas that the transmission line follows. These sloping areas exposed during construction should be limited as much as is reasonably possible.

7. REFERENCES


MMAMABULA ENERGY PROJECT

Environmental Impact Assessment

BASELINE NOISE STUDY FOR THE TRANSMISSION LINE PROJECT

NOVEMBER 2006
MMAMABULA ENERGY PROJECT

BANKABLE FEASIBILITY STUDY

VOLUME X : BASELINE NOISE STUDY FOR THE TRANSMISSION LINE PROJECT

NOVEMBER 2006

Prepared by:

F le R Malherbe Pr Eng
François Malherbe Acoustic Consulting cc
EXECUTIVE SUMMARY

The Mmamabula Energy Project includes the construction of an electrical power transmission line between the power station and the target areas. This will require construction activities to be distributed over a very large area and have the potential to affect the ambient noise levels at various locations that are in proximity to the transmission line.

It is the aim of this study to describe the present environment in which the development will take place and identify the possible key risks involved.

The purpose of this noise study was the following:

- To identify the noise sensitive receptors that will be affected by the construction and operation of the transmission line;

- To estimate the present ambient noise levels at the identified noise sensitive receptors;

- To identify the key issues that will influence the possible noise impact that the construction and operation of the transmission line will have.

A site visit was conducted between the 11th and 14th of September 2006 concurrent with the baseline noise study for the Mmamabula Energy Project. The purpose of the site visit was to familiarise the consultant with the typical environment of the area through which the transmission line will be constructed.

Sampling measurements were carried out as part of the Mmamabula Energy Project baseline study. The results of these measurements were assumed to be representative of the noise sensitive areas that will be affected by the construction and operation of the transmission line.

The topography in the area of the proposed development is very flat, i.e. there will be no screening against the propagation of noise from the source to the receiver.

The vegetation is densely grown bush and tree land and the ground conditions are to a large degree very sandy. These conditions will provide excess attenuation of the noise as it propagates from the source to the receiver.

The noise sensitive areas that were identified as possible areas of noise impact from the transmission line were Mosomane, Dibete, Mookane, Mahalapye and Dikabeya.
The present ambient noise levels were measured at Dibete and Mookane. In terms of their noise climates Mosomane and Dikabeya are comparable to Dibete, and the outskirts of Mahalapye can probably be compared to the centre of Mookane.

The current ambient noise level at both the measurement points conform to the guideline levels specified by the World Bank, i.e. 55 dBA during the day and 45 dBA during the night.

The most severe noise impact will occur during the construction phase of the transmission line, particularly when the site is cleared and prepared for the construction of a tower.

However, this impact is considered to be benign since it occurs for a limited time and only during the day, when people are less sensitive to noise intrusion.

During the operation of the transmission line the noise impact is considered to be minimal and limited to the immediate vicinity of the facility itself.
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1. INTRODUCTION

The Mmamabula Energy Project includes the construction of an electrical power transmission line between the power station and the target areas. This will require construction activities to be distributed over a very large area and have the potential to affect the ambient noise levels at various locations that are in proximity to the transmission line.

It is the aim of this study to describe the present environment in which the development will take place and identify the possible key risks involved.

2. PURPOSE OF THE STUDY

The purpose of this noise study was the following:

- To identify the noise sensitive receptors that will be affected by the construction and operation of the transmission line.
- To estimate the present ambient noise levels at the identified noise sensitive receptors,
- To identify the key issues that will influence the possible noise impact that the construction and operation of the transmission line will have.

3. METHODOLOGY OF THE STUDY

3.1. Site visit

A site visit was conducted between the 11th and 14th of September 2006 concurrent with the baseline noise study for the Mmamabula Energy Project. The purpose of the site visit was to familiarise the consultant with the typical environment of the area through which the transmission line will be constructed.

3.2. Sampling measurements

Sampling measurements were carried out as part of the Mmamabula Energy Project baseline study. The results of these measurements were assumed to be representative of the noise sensitive areas that will be affected by the construction and operation of the transmission line.

4. RESULTS OF THE STUDY
4.1. **Description of the environment**

The topography of the area of the proposed development is very flat, i.e. there will be no screening against the propagation of noise from the source to the receiver.

The vegetation is that of densely grown bush and tree land and the ground conditions are to a large degree very sandy. These conditions will provide excess attenuation of the noise as it propagates from the source to the receiver.

4.2. **Identified noise sensitive areas**

The following noise sensitive areas were identified:

4.2.1. **Mosomane**

This village lies at the southern end of the transmission line development and is similar to the village of Dibete further north where the ambient noise level was sampled during the day.

4.2.2. **Dibete**

This village is typical for those that occur at regular intervals along the B1 that connects Gabarone to the North of the country. Traffic on the main road determines to a large extent the ambient noise level together with other community noises. The ambient noise level that was measured here during the day complied with the guideline level of 55 dBA set by the World Bank.

4.2.3. **Mookane**

This village is typical for a rural setting, e.g. there are no tarred roads, and ambient noise levels can be quite low. Those measured fell well within the guideline levels set by the World Bank.

4.2.4. **Mahalapye**

This is a larger town and the guideline levels set by the World Bank, i.e. 55 dBA during the day and 45 dBA during the night.

4.2.5. **Dikabeya**

This village is north of the town of Palapye and is similar to Dibete and similar ambient noise levels can, therefore, be expected.

4.3. **Measured ambient noise levels**

The ambient noise levels that were measured as part of the Mmamabula Energy Project baseline study and that are applicable to this project are repeated here in Table 4.3.1.

<table>
<thead>
<tr>
<th>TABLE 4.3.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured ambient noise levels.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measurement point</th>
<th>Period</th>
<th>World Bank requirement dBA</th>
<th>$L_{Aeq}$ (15 min) dBA</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mookane</td>
<td>Day</td>
<td>55</td>
<td>47.5</td>
<td>Community noise, i.e. people talking, children playing and shouting. Banging noises. Bird song. Car passes measurement point and people talking.</td>
</tr>
<tr>
<td></td>
<td>Night</td>
<td>45</td>
<td>42.9</td>
<td>Insect noise, i.e. crickets. Cattle in close proximity cause some noise at intervals. Very quiet at times.</td>
</tr>
<tr>
<td>Dibete</td>
<td>Day</td>
<td>55</td>
<td>51.4</td>
<td>Generator at filling station clearly audible. Traffic on main road as well as local. Community noise.</td>
</tr>
<tr>
<td></td>
<td>Night</td>
<td>45</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

The following remarks are applicable to the results:

4.3.1. Mookane

The measured ambient noise levels fall well within the requirements set by the World Bank Guidelines, although the measurement results during the night were higher than expected. This is due to the noise events caused by the cattle in close proximity to the measurement point. In the absence of these noise events and the constant noise caused by the crickets the ambient noise level was very much lower.

4.3.2. Dibete

The ambient noise level remains fairly constant at the measured level of between 50 dBA and 52 dBA. It is to be expected that the ambient noise level will drop by approximately 10 dBA during the night. In this case the measured ambient noise levels fall well within the requirements set by the World Bank Guidelines.

4.4. Estimated impact of the transmission line on ambient noise levels

There are two distinct phases when the issue of noise is relevant, i.e. the construction and the operational phase of the transmission line.

4.4.1. The construction phase

The erection of transmission towers will require earth works, the casting of foundations, the assembly and erection of the towers and, finally, the spanning of the transmission cables. In the opinion of the consultant the first component, i.e. the earth works, will be the noisiest since it involves the use of diesel powered equipment. The consultant, however, is also of the opinion that the noise impact will be very limited in extent for the following reasons:

- The area of construction is very limited;
- The time period required for construction at each site is short;
- Construction is very likely to take place only during the day, i.e. there will be no noise impact during the noise sensitive hours of the night.
4.4.2. The operational phase

During the operational phase any noise emissions from the transmission line will be due to electrostatic effects, such as the Corona-effect, or noise generated by the wind in the structure of the towers or cables. The consultant is of the opinion that the noise generated by these sources, should it occur, will be very much restricted to the immediate vicinity of the transmission line.

5. CONCLUSIONS

The following conclusions are drawn on the results of this study:

- Although the topography will not provide any screening against the propagation of noise, the ground conditions are generally acoustically ‘soft’, i.e. will provide excess attenuation through absorption;

- The noise sensitive areas are the five villages and towns where the transmission line will pass in relative close proximity.

- The most severe noise impact will occur during the construction phase of the transmission line, particularly when the site is cleared and prepared for the construction of a tower.

- However, this impact is considered to be benign since it occurs for a limited time and only during the day, when people are less sensitive to noise intrusion.

- During the operation of the transmission line the noise impact is considered to be minimal and limited to the immediate vicinity of the facility itself.

6. REFERENCES

In this report reference was made to the following documentation: