Appendix I.6: Project Alternatives

PROJECT ALTERNATIVES

In terms of the EIA Regulations, feasible alternatives are required to be considered. All identified, feasible alternatives are required to be evaluated in terms of social, biophysical, economic, and technical factors. A key challenge of the BA Process is the consideration of alternatives. Most guidelines use terms such as 'reasonable', 'practicable', 'feasible' or 'viable' to define the range of alternatives that should be considered.

Effectively there are two types of alternatives:

- Incrementally different (modifications) alternatives to the project; and
- Fundamentally (totally) different alternatives to the project.

"Alternatives", in relation to a proposed activity, means different ways of meeting the general purpose and requirements of the activity, which may include alternatives to –

a) the property on which or location where it is proposed to undertake the activity;

b) the type of activity to be undertaken;

c) the design or layout of the activity;

d) the technology to be used in the activity;

e) the operational aspects of the activity; and

f) the option of not implementing the activity (i.e. no-go).

The relevant alternatives to the proposed Project are discussed below.

ACTIVITY ALTERNATIVE

Alternative activities for the proposed project are not reasonable or feasible as the purpose of this project is to transmit electrical energy generated by the proposed Igolide WEF through the onsite substation for distribution via the national electrical grid network.

LOCATION ALTERNATIVES

The purpose of the OHPL is to connect the Proposed Igolide WEF to the national grid. Therefore, the OHPL is required to be located between the on-site substation for the Wind facility and that of the existing East Drie Five substation.

LAYOUT ALTERNATIVES

The approach used for the project is to apply for approval of a corridor that would reasonably be able to accommodate the proposed gridlines and its associated infrastructure. As per the requirements of GN 145, a pre-negotiated gridline alignment has been presented within this Report. . A corridor of up to 250m in width (125m on either side of the centre line) has been identified for the placement of the up to 132kV single or double circuit power line to allow flexibility in the design of the final power line route, and for the avoidance of sensitive environmental features (where possible).

Therefore, no layout alternatives are put forward for assessment. The impact assessment provides an assessment of the corridor in which all "No-Go's", restrictions and requirements in terms of environmental constraints are identified to

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limit the impact to sensitive areas/features (within the levels of acceptable change defined by the respective specialists) of any reasonable grid alignment within the corridor.

TECHNOLOGY ALTERNATIVES

There are two methods of power transmission, these being overhead lines and underground cables. Underground cables are considerably more difficult and expensive to install and maintain, relative to overhead lines. Considering the proposed terrain of the proposed OHPL, which traverses several watercourses including the tributaries of the Vaal River, underground cables would require extensive trenching which would result in greater environmental impacts. Underground distribution lines are therefore not considered feasible for the proposed Project.

The 132kV OHPL is a more viable option for the proposed activity and more emphasis, as this is considered the most appropriate technology and is in line with Eskom design requirements.

MONOPOLE-TYPE PYLONS

The type of pylon to be used depends on the topography and the alignment of the powerline corridors. In general, monopole-type pylons are used for transmission lines with shorter spans.

132KV INTERMEDIATE SELF-SUPPORTING DOUBLE CIRCUIT MONOPOLE (PREFERRED)

Self-supporting galvanised steel Monopole Intermediate or Suspension structure with no stays/anchors. The monopole is designed to support a double electrical circuit with a twin conductor arrangement. The monopole height varies between 26m and 32m **(Figure 0--1)**.

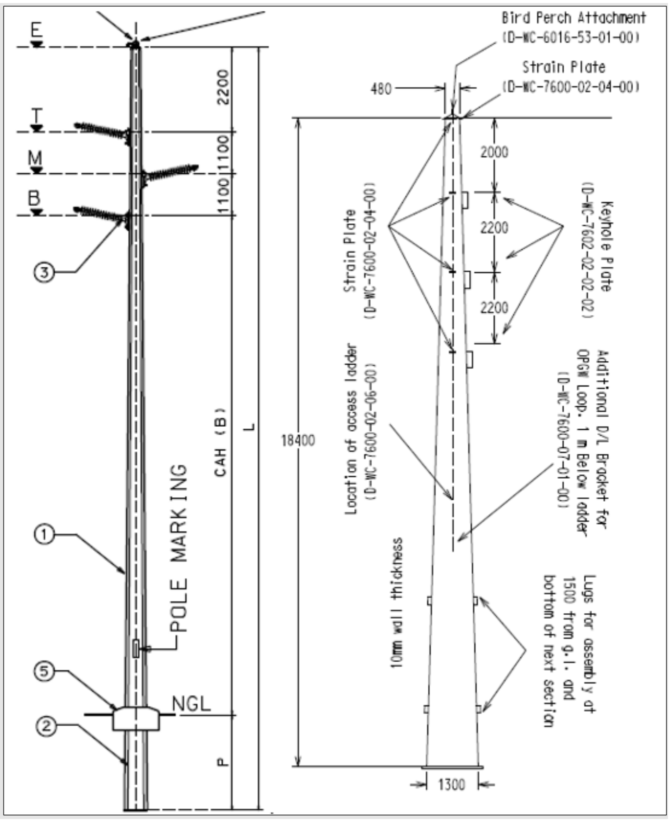

Figure 0--1: 132kV intermediate self-supporting double circuit monopole

132KV INLINE OR ANGLE STRAIN SELF-SUPPORTING DOUBLE CIRCUIT MONOPOLE

Self-supporting galvanised steel Monopole Inline or Angle Strain structure with no stays/anchors. The monopole is designed to support a double electrical circuit with a twin conductor arrangement, This structure will be used as the strain structure and will be positioned at the angle points along the line or as an inline position where a strain point is required due to the ground elevation. The monopole height varies between 26m and 32m (**Figure 0--2**).

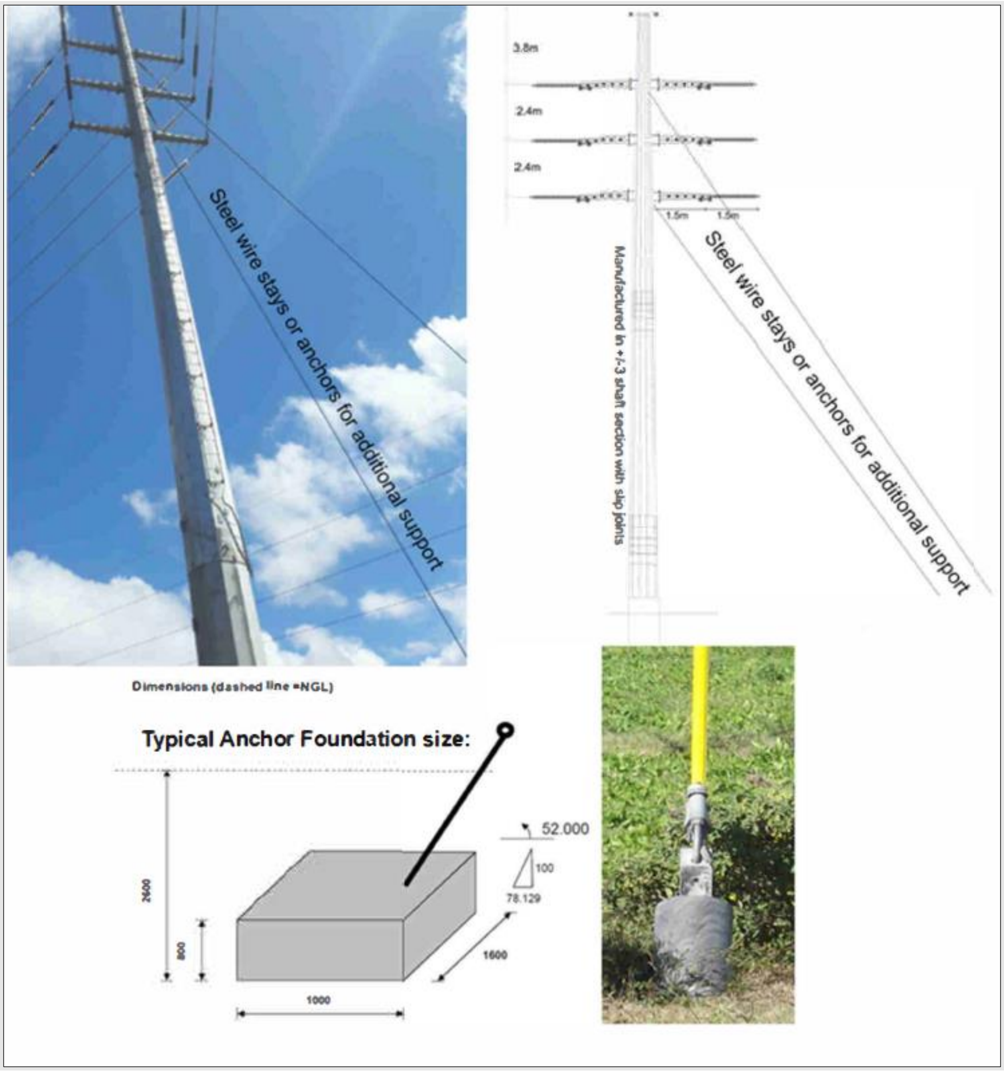

Figure 0--2: 132kV inline or angle strain self-supporting double circuit monopole

132KV SUSPENSION SELF-SUPPORTING SINGLE CIRCUIT MONOPOLE WITH SINGLE CONDUCTOR

Self-supporting galvanised steel Monopole Suspension structure with no stays/anchors. The monopole is designed to support a single electrical circuit with a single conductor arrangement. The monopole height varies between 22m and 26m (**Figure 0--3**).

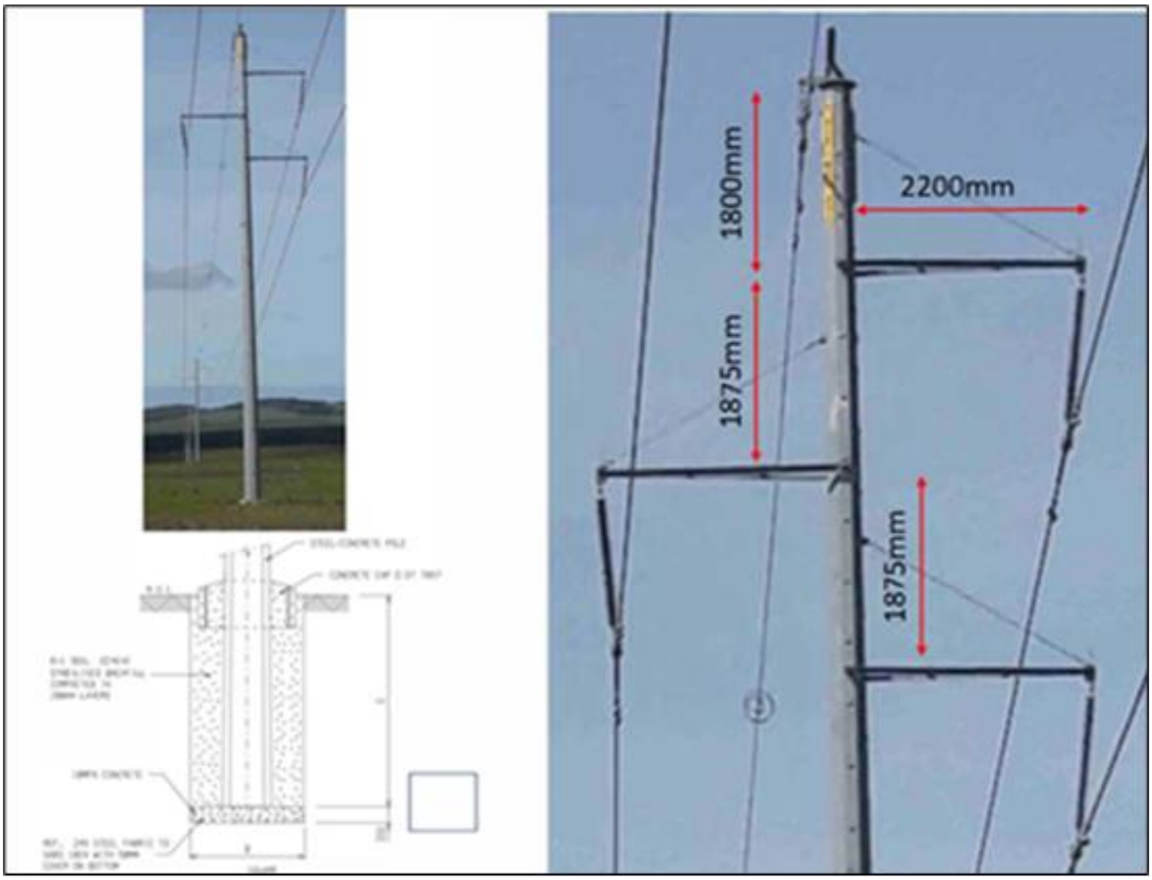

Figure 0--3: 132kV suspension self-supporting single circuit monopole with single conductor

132KV INLINE OR ANGLE STRAIN SELF-SUPPORTING SINGLE CIRCUIT MONOPOLE WITH SINGLE CONDUCTOR

Self-supporting galvanised steel Monopole Inline or Angle Strain structure with no stays/anchors. The monopole is designed to support a single electrical circuit with a single conductor arrangement. The monopole height varies between 24m and 26m. The foundation will consist of a typical pad foundation with bolts inside the concrete foundation (**Figure 0--4**).

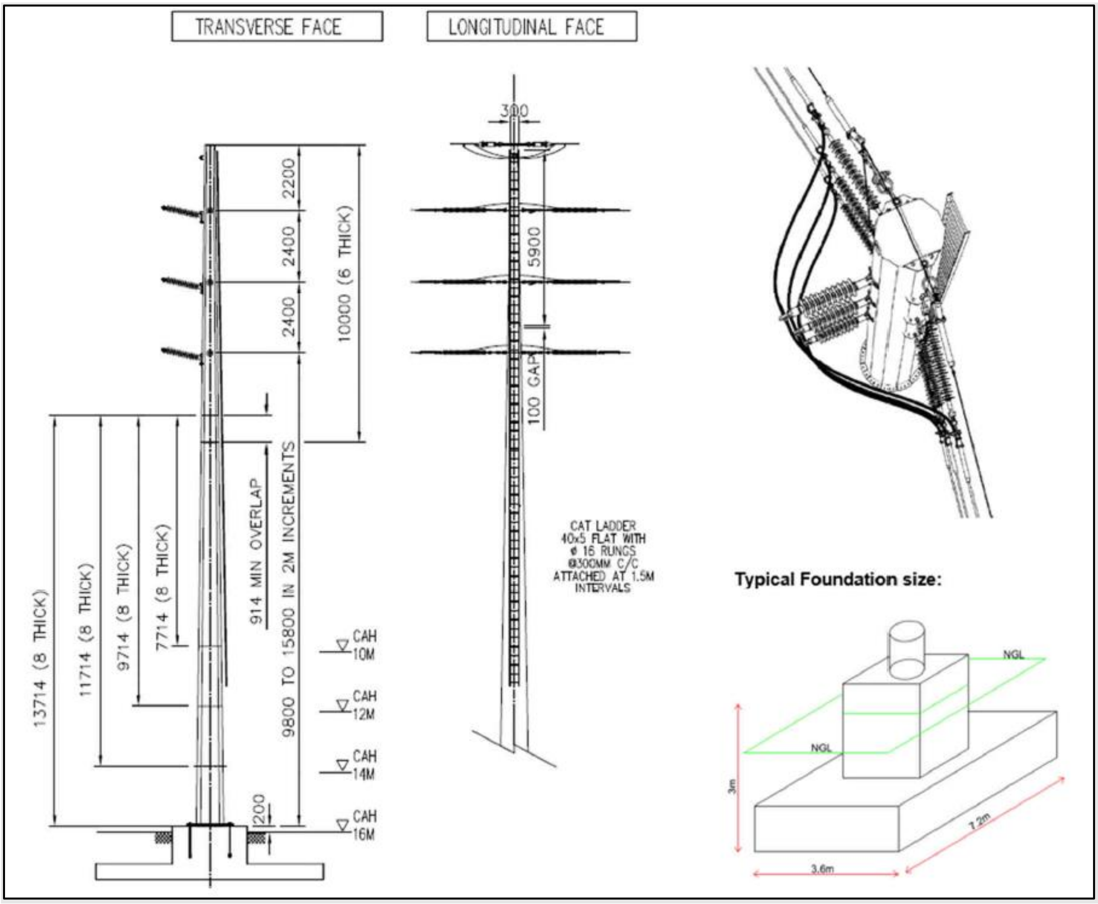

Figure 0--4: 132kV inline or angle strain self-supporting single circuit monopole with single conductor

STEEL LATTICE TOWERS

Steel lattice-type pylons are typically used where long spans (>500m) across valleys and rivers are required, however may be employed elsewhere depending on terrain specific requirements as informed by detailed design.132kV/275kV Powerline Double Circuit Suspension Towers.

Consist of a steel framework of individual structural components that are bolted or welded together. Can be designed to carry either one or two electrical circuits, referred to as single-circuit and double-circuit structures. The lattice pylons height varies between 25m and 40m (**Figure 0--5**).

Figure 0--5: 132kV/275kV powerline double circuit suspension towers

FOUNDATION

The type of foundation required for each pylon is dependent on the geo-technical conditions. Foundations may be drilled, mechanically excavated, or dug by hand. All foundations are backfilled and stabilised through compaction and capped with concrete at ground level. Below **(Figure 5-6)** are two examples of monopole foundations for different soil conditions.

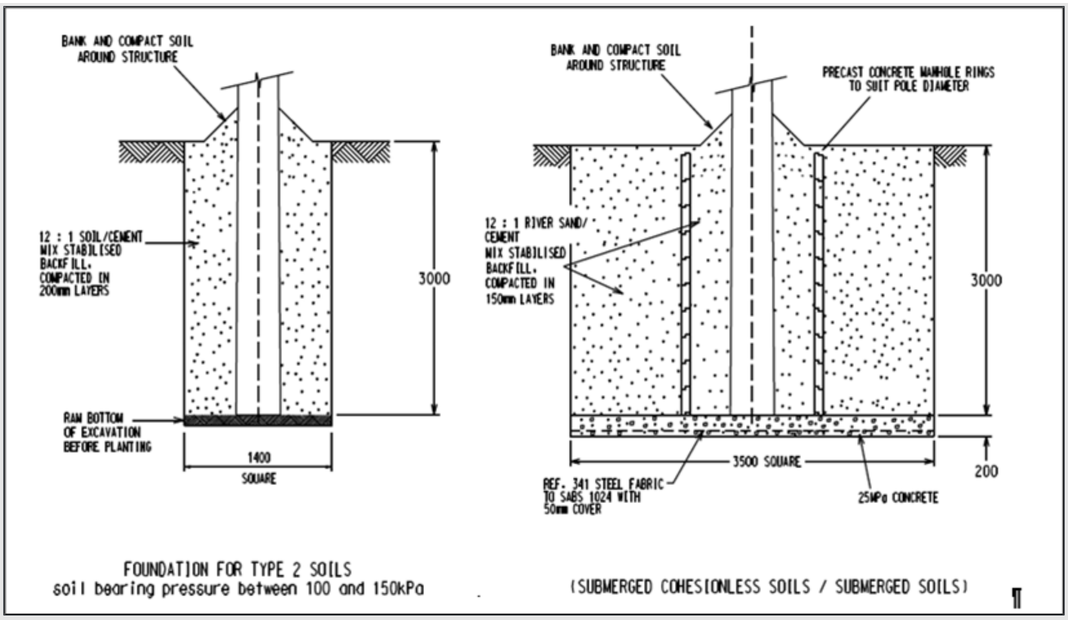

Figure 0.-6: type of foundation required for each pylon

OPERATIONAL ACTIVITIES

Eskom will be responsible for the operation of the OHPL and the 132kV portion of the onsite substation once it has been constructed and commissioned. Eskom will be responsible to implement the operational EMPr along with mitigations proposed as a result of this BAR. For this reason, no further consideration has been given to operational alternatives.

NO-GO ALTERNATIVE

The no-go option will mean the status quo remains. Both the potential positive and negative impacts from the proposed OHPL will not occur. In addition, the associated up to 100MW of Wind Energy Facility will be unable to connect to the national grid and therefore the production of this facility will not be available to the nation.
The no-go option would represent a lost opportunity for South Africa to improve energy security and supplement its current energy needs with renewable energy given that energy security benefits associated with the proposed Igolide WEF and associated infrastructure are dependent upon it being able to connect to the national grid via the establishment of grid connection infrastructure. Considering South Africa's current energy security challenges and its position as one of the highest per capita producers of carbon emissions in the world, this would represent a significant socio-economic cost. Accordingly, the no-go option is not deemed viable.
Specialists have considered the no-go alternative, and the following has been concluded:

- Agriculture:

  The no-go alternative considers impacts that will occur to the agricultural environment in the absence of the proposed development. There are no agricultural impacts of the no-go alternative, but this is not significantly different from the very low impact of the development, and so from an agricultural impact perspective, there is no preferred alternative between the no-go and the development. However, the no-go option would prevent the proposed development plus the dependent renewable energy development, which cannot operate without a grid connection, from contributing to the environmental, social, and economic benefits associated with the development of renewable energy in South Africa.

- Terrestrial Biodiversity:

  If the proposed Project does not proceed, it is anticipated that the current land use status quo will continue into the future. The tracts of grassland and savanna habitat in the study area will continue to be used for livestock and game farming, which may lead to incidences of overgrazing, which may drive the homogenisation of habitats and reduce both fauna and flora diversity.
  It is also likely that overtime, AIS growing in the study area (such as *Acacia mearnsii* and *Solanum mauritianum*) will continue to expand their current distribution. This may compromise habitat integrity and negatively impact both fauna and flora diversity, and potentially the persistence of Species of Conservation Concern (SCC).

- Animal Species

  If the proposed Project does not proceed, it is anticipated that the current land use status quo will continue into the future. The tracts of grassland and savanna habitat in the study area will continue to be used for livestock and game farming, which may lead to incidences of overgrazing, which may drive local changes in flora species composition and the ability of the land to carry livestock. Overgrazing is also likely to drive the homogenisation of habitats, which may reduce the diversity of fauna species occupying the site, including SCC.
  It is also likely that overtime, AIS growing in the study area (such as *Acacia mearnsii* and *Solanum mauritianum*) will continue to expand their current distribution. This may compromise habitat integrity and negatively impact fauna diversity and SCC.

- Plant Species

If the proposed Project does not proceed, it is anticipated that the current land use status quo will continue into the future. The tracts of grassland and savanna habitat in the study area will continue to be used for livestock and game farming, which may lead to incidences of overgrazing, which may drive local changes in flora species composition. It is also likely that overtime, AIS growing in the study area (such as Acacia mearnsii and Solanum mauritianum) will continue to expand their current distribution. This may compromise habitat integrity and flora diversity, including the persistence of flora SCC.

- Aquatic Biodiversity

In the no-go scenario, the Project would not be developed and the existing status quo would likely be maintained, that being that the Moderately Modified PES (**Error! Reference source not found.**) ascribed to all assessed wetlands would persist, with long-term habitat degradation as a result of existing impacts, including impoundment of water at dams, alien invasive species colonisation at road crossings and development of preferential flow paths along animal tracks, likely to take place at the current rate of degradation.

- Heritage and palaeontology

If the project were not implemented, then the site would stay as it currently is (impact significance of neutral). Although the heritage impacts with implementation could potentially be greater than the existing impacts, the loss of socio-economic benefits (i.e. new electricity generation) is more significant and suggests that the No-Go option is less desirable in heritage terms.

- Social Impact

The No-Development option would represent a lost opportunity for South Africa to improve energy security and supplement is current energy needs with renewable energy. Given South Africa's current energy security challenges and its position as one of the highest per capita producers of carbon emissions in the world, this would represent a negative social cost.

- Visual

The 'no-go' alternative is the option of not undertaking the proposed project. Hence, if the 'no-go' option is implemented, there would be no development. The area would thus retain its visual character and sense of place, and no visual impacts would be experienced by any locally occurring receptors.