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BOSA

TRANSMISSION PROJECT

BOSA TRANSACTION ADVISORY SERVICES

ADDENDUM: CORRIDOR SELECTION PROCESS REPORT

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SECTION 1

1 Transmission Line Corridor Route Selection Process

1.1 Introduction

The Transaction Advisor is responsible for the Preliminary Design and the Environmental and Social Impacts Assessment (ESIA) for the Isang to Watershed 400kV transmission lines. In Part 1 of the Study, undertaken in 2016, the optimum route was selected between the proposed Mahikeng MTS (Watershed B) substation in South Africa and the existing Isang substation in Botswana, based on technical, environmental, social and strategic considerations.

A load growth south of the Mahikeng Airport required that Eskom change the location of Watershed B to a new site located approximately 25 km to the north east of the original site. This resulted in a material change to the location, with associated implications for the TA in delivering on the BOSA project scope of work.

The objective of this Addendum is to address the change in route in the southern part of the study area from the base study of the line routing and associated functional design to ensure that an optimal route is selected between the new Watershed B location and Isang. This updated route will form the base of the detailed analysis in Part 2.

1.2 Route selection process

1.2.1 Identification of potential routes

Eskom confirmed with the TA in January 2017 that the revised general area for the new substation location was fixed and that three specific sites had been identified in this area to allow for the consideration of alternatives during their Environmental Impact Assessment (EIA) process. Provisional specialist input, focused on the proposed three sites for Watershed B and the broad area to connect to the pre-existing preferred route (Route C), was used to identify constraints in the greater area. This exercise demonstrated no substantive constraint in the area, allowing for routing around specific areas of concern.

The Western Route options were reviewed in a workshop environment in January 2017 to determine if the preferred route selected (Route C) remained the preferred route. The attendance register for the workshop is attached in Appendix 1. The workshop was attended by representatives of the design team, the social and environmental team, Eskom and SAPP. The preferred eastern route was compared against the western routes and it was concluded that the constraints related to other alternative routes identified in the initial route selection process remained valid and Route C remained the preferred option.

The same route identification process detailed in the Route Selection Report (described in the Report to which this Addendum is attached) was followed to identify the most feasible transmission line corridors from Watershed B substation to link up to Route C. Three line route alternatives were identified in an iterative and collaborative process at the same workshop on 31 January 2017. The meeting concluded that these options provided sufficient indication of the potential for the linking of the revised Watershed B general location to pre-existing Route C, to warrant further analysis. These alternatives are shown in **Figure 1.**

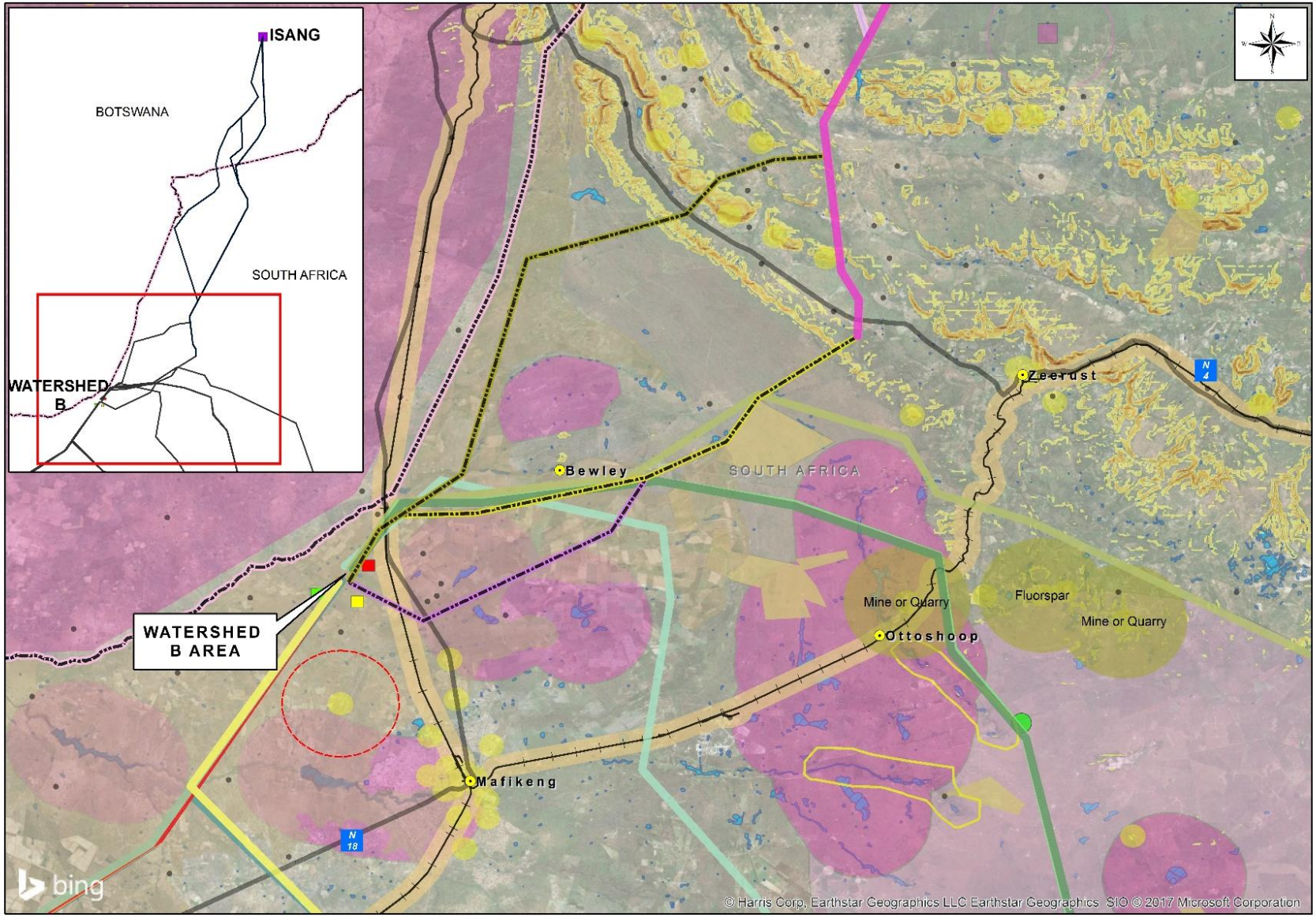

Figure 1: Map of the three alternative routes linking Watershed B substation to the preferred Route C

1.2.2 MCDM process

The methodology used is described in the Report to which this Addendum is linked and is not repeated in detail here. The MDCM process was run remotely with the social, heritage, avifaunal, ecological and visual specialists. The technical criteria were assessed in a workshop on 24 April 2017 with the technical team and representatives of Eskom, BPC, SAP and DBSA. The attendance register for the MCDM workshop is attached in Appendix 1.

Participants representing particular fields of expertise or interests assessed the route options against one another, on a one to one basis, to reach consensus on which option is preferred and by what margin. This process was repeated until all options and scenarios had been compared with all other options and scenarios using each of the pre-selected criteria. The MCDM Model then arithmetically collated preference scores and provided an overall ranking of the options. The MCDM model works on the premise that an experienced professional can readily determine which options are preferred when considered against certain criteria, e.g. environmental, without the need for detailed assessment.

CRITERIA USED

With one exception, the same criteria used in the initial MCDM to score the potential corridors were used for the route between Watershed B and Route C (Table 1). After discussion, it was decided that the strategic category was not valid in terms of differentiating one route against the other and was thus dropped in the MCDM process for the route between new Watershed B and Route C. The description of one criterion was altered slightly as the original descriptors did not fit the current area. The change relates to Te4, where the criterion of width was deemed to consider whether more than one landowner could be accommodated within a 1 km corridor. As in the previous process, the environmental and social aspects were considered to carry more weight than the technical criteria.

Table 1: MCDM Criteria

Category	Criteria	Description
Technical (Inc. Financial)	Te1. Slope	Avoid steep slopes more than 1:10
	Te2. Access	Constructability and maintainability in terms of construction and access to site
	Te3. Length	Line length and associated cost
	Te4. Width	Width of corridor allows for more than one landowner to facilitate landowner negotiations
Environmental	En1. Biodiversity	Aquatic and terrestrial ecology; Ecological services
	En3. Avifauna	Flight paths; Nesting areas, Focal points
Social	So1. Heritage	Archaeological and cultural heritage resources
	So2. Compensation	Homes or other assets that will require resettlement or other compensation
	So3. Communities	Proximity to existing large villages or towns that will remain, distance to communities, agricultural resources
	So4. Visual	Visibility on ridges, potential tourism

RESULTS

The results are discussed below in terms of the individual criteria.

(a) Technical

Technical criteria consider the cost and ease of both construction and operation, as well as other aspects such as landowner negotiations related to the physical properties of the line, which may increase costs and length of the process involved.

Slope: There is little difference between Routes T1 and 2 and the routes were equally preferred on this aspect and there was a weak preference for Routes T1 and R2 over Route 3, based on the slope constraints related to Route T3.

Access: The same preference was shown for the criterion as for slope as access becomes more difficult in mountainous areas and there are usually fewer access roads as well.

Length: Route T2 (48 km) is shorter than Routes T1 (50 km) and T3 (59 km) and therefore is marginally preferred, as it will cost less to build.

Width: The ability to accommodate more than one landowner in a corridor was considered for this criterion. Route T1 was the least preferred for this route as there is a lot of commercial farming in the area and the properties are fairly large along stretch of the route. Route T2 was weakly preferred over Route T3 as

Route T2 was considered the best route from an overall technical perspective (Figure 2). Technical considerations ensure the most cost-effective solution for the lifecycle of the project for the planning stages, through construction and operation to decommissioning.

Consolidated Technical results

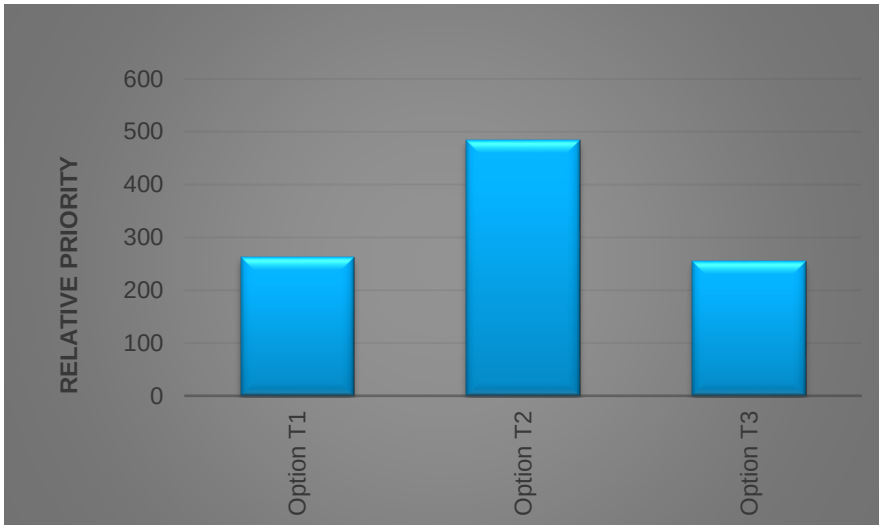

Figure 2. Route preferences based on technical criteria

(b) Environmental

Consideration of this aspect early on in the project planning ensures that constraints related to the biophysical environment are incorporated into the project at the earliest possible stage, contributing to environmentally responsible development and preventing project delays at a later stage in the project.

Ecology

Potential impacts on the biophysical environment include loss and alteration of terrestrial and aquatic habitat, loss of protected species and introduction of alien invasive plant species. The significance of the impact of a proposed transmission line is influenced by current level of disturbance along the route and the degree to which the proposed line will increase the levels of disturbance, as well as the uniqueness of the environmental resources that will be affected. Due to the nature of transmission lines, the construction phase is the most environmentally disruptive and many ecological systems can continue to function under the lines once operational. Limited area is lost through the construction of the towers and access roads. Animals will return to the site following construction. Environments with trees are most compromised by overhead lines as a corridor will need to be cleared and maintained as such to ensure sufficient clearance between the lines and trees. Most wetland areas within 2 km corridors can be avoided in the detailed design.

Route T1 was preferred marginally preferred over Route 2 and markedly preferred over Route T3 from an ecological perspective as the vegetation along the route has been altered by farming and development and is less sensitive. There are also fewer wetlands and few current and proposed formal and informal protected areas and areas of importance for fauna and flora along Route T2. There is a Threatened Ecosystem (NEMBA) - Mafikeng Bushveld which occurs along the route but this is largely transformed by agriculture.

Avifauna

One of the main considerations for high voltage lines is possible bird collisions with the conductors. The collision potential is influenced by the flight behaviour of sensitive species and visibility of the conductors. Breeding areas, roosting and feeding areas and migration routes all influence where there will be high avifaunal activity and which areas will be most sensitive in terms of avifauna. The following aspects were considered when ranking the routes in order of preference:

- Proximity to vulture breeding areas
- Proximity to Important Bird Areas (IBA)
- Proximity to dams (avifaunal focal points)
- Proximity to vulture restaurants (avifaunal focal points)
- Proximity to protected areas

T2 was strongly preferred over T1 and T3 based on the shorter line length, the fewer wetland bodies and the less mountainous areas.

Consolidated Environmental results

Route T2 was considered the best route from an overall environmental perspective **(Figure 3).** Environmental considerations ensure a more environmentally sustainable solution for the lifecycle of the project for the planning stages, through construction and operation to decommissioning.

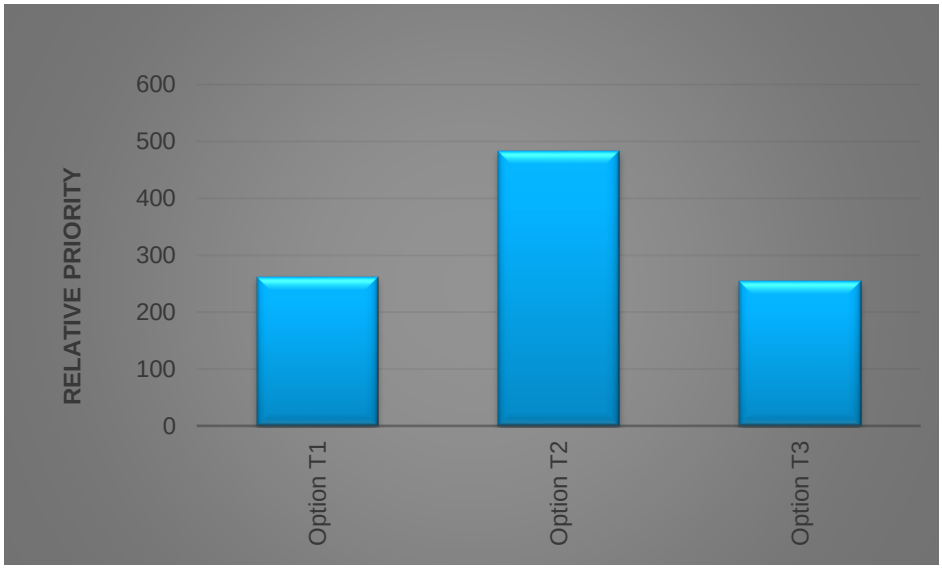

Figure 3. Preferred route from an environmental perspective

(c) Social

Consideration of this aspect early on in the project planning ensures that constraints related to the social environment incorporated into the project at the earliest possible stage, contributing to socially responsible development and preventing project delays at a later stage in the project.

Heritage

Heritage resources are protected by law. Route T1 cuts through parts of elevated mountainous Swartruggens" hills, which are known to contain occupational sites of both Iron and Stone Ages. It also runs through some developed areas (lowest sensitivity), but the greenfield areas may have heritage significance.

Route T2 follows the same alignment through hilly areas to northeast as Route 1. The alignment almost exclusively runs through developed agricultural fields in flats in south which have very low heritage significance.

Route T3 also passes through large sections of Swartruggens Mountains which have a high potential for heritage sites. It also runs through a large section of greenfield area on lowlands where there is a higher potential to impact on potential heritage sites.

Route T2 is weakly preferred above Route T1 but is absolutely preferred over Route T3.

Compensation and Communities

Both these criteria are influenced by the numbers and density of settlements and dwellings along the route, which must be avoided, as should places of interest along route. Resettlement is considered the most severe of social impacts and is to be avoided wherever possible and it is advisable to avoid physically dividing properties. The shorter the route the better.

Routes T1 and T2 were considered to have the same preference and these were both absolutely preferred over Route T3, based on the number of towns, settlements and farm houses and placed of interest along the route, as well as cadastral boundaries, indicating density of settlement.

Visual

Transmission lines can affect the aesthetic quality of a landscape from a visual perspective. The visual impacts is influenced by the length of corridor, the topography (more visual on higher lying areas versus lower lying areas), as well as the proximity to national roads and tourism attractions. From a visual perspective, Route T2 is weakly preferred over T1 as is the shorter and absolutely preferred over T3, which traverses ridges and is closer to national road.

Consolidated social results

Route T2 was considered the best route from an overall social perspective (Figure 4). Environmental considerations ensure a more socially sustainable solution for the lifecycle of the project for the planning stages, through construction and operation to decommissioning.

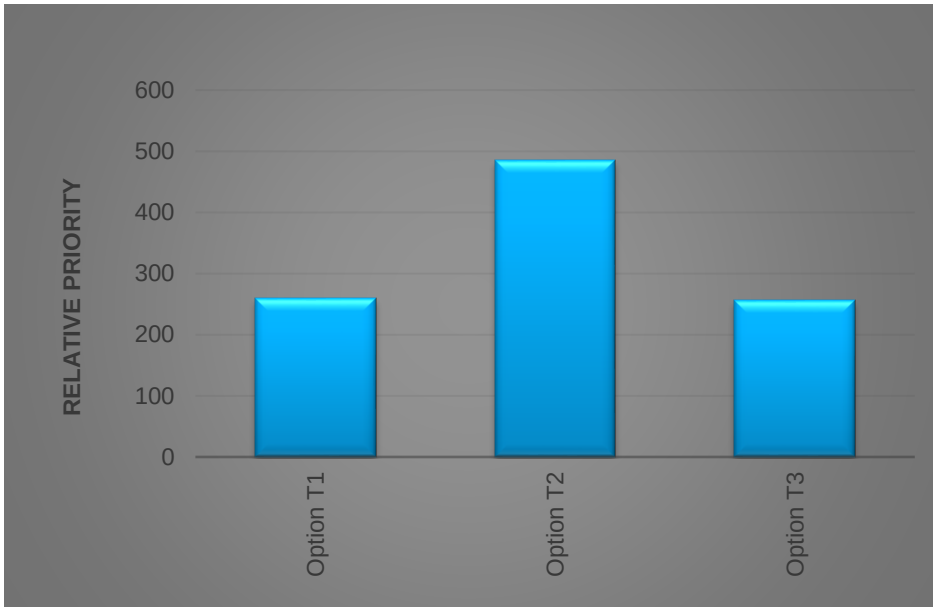

Figure 4. Preferred route from a social perspective

OVERALL RESULTS

All criteria were integrated to show the best routes overall. The integrated results of the MCDM process are shown below (**Table 2** and **Figure 5**) based on the criteria used to assess the route alignment, showing how each alignment scored. Route 2 is preferred and Route 3 is least preferred. The same order of route alignment preference was achieved with all criteria having the same weighting, although the degree of preference was minimally altered.

Table 2: Summary Preferences per category

Category	T1	T2	T3
Technical (including financial)	**2**	**1**	**3**
Environmental	**3**	**1**	**2**
Social	**2**	**1**	**3**

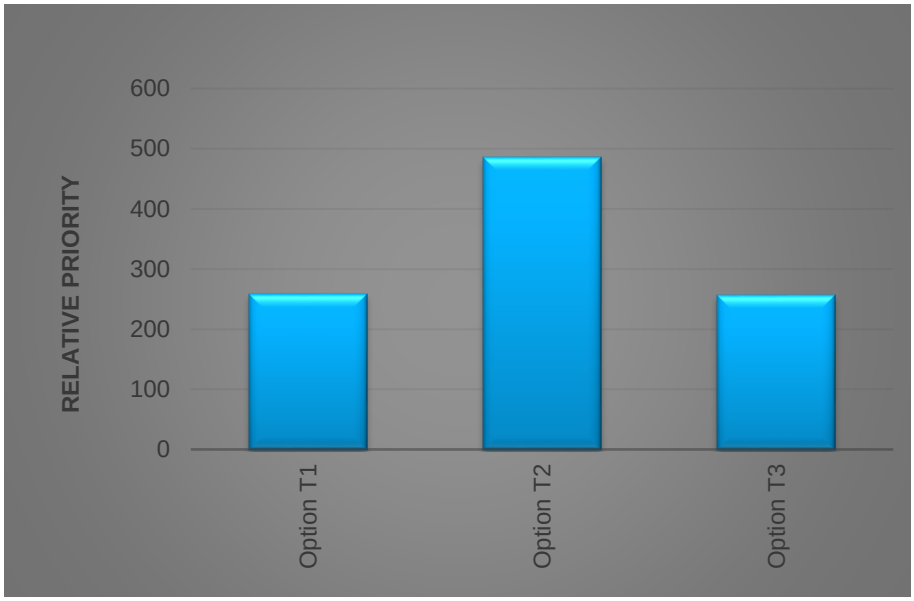

Figure 5. Preferred route from an integrated perspective

1.3 Conclusion and way forward

Based on the above outcome it is recommended that Route T2 be taken forward as the preferred alternative to link Watershed B to Route C leading to Isang substation. The updated preferred route will be assessed in detail in the ESIA which will allow for identification of potential mitigation measures to further reduce predicted impacts from the project.