- Ensure compliance with the relevant legislation.

9.2 Alternatives and Site Selection

A screening study was initiated upfront in the process in order to identify potential sites within the study area that would be suitable for use as alternative sites for the proposed new ash dam. The study area was demarcated using an 8 km radius around the Hendrina Power Station. Within this 8km radius two further demarcations where included, although based on technical impacts such as the costs involved in the project and the risk of security of supply, the distances involved also take into account the potential additional environmental impacts in terms of the distance required for new infrastructure to be constructed and operated.

- A 3 km radius within which no additional technical costs would be incurred in terms of the construction and operational of the proposed new ash dam;
- A 5 km radius within which minimal additional technical costs would be incurred in terms of the construction and operation of the proposed new ash dam

In order to ensure that sites were identified in the most objective manner possible, a sensitivity mapping exercise was undertaken for the study area. The purpose of such an exercise was to identify suitable areas within the study area that could accommodate the proposed new ash dam and associated infrastructure and to pro-actively identify sensitive areas (i.e. fatal flaws) that should ideally be avoided. **Figure 9.4** shows the final sensitivity map that was utilised to identify the five alternative sites (**Figure 9.5**) assessed in this scoping report.

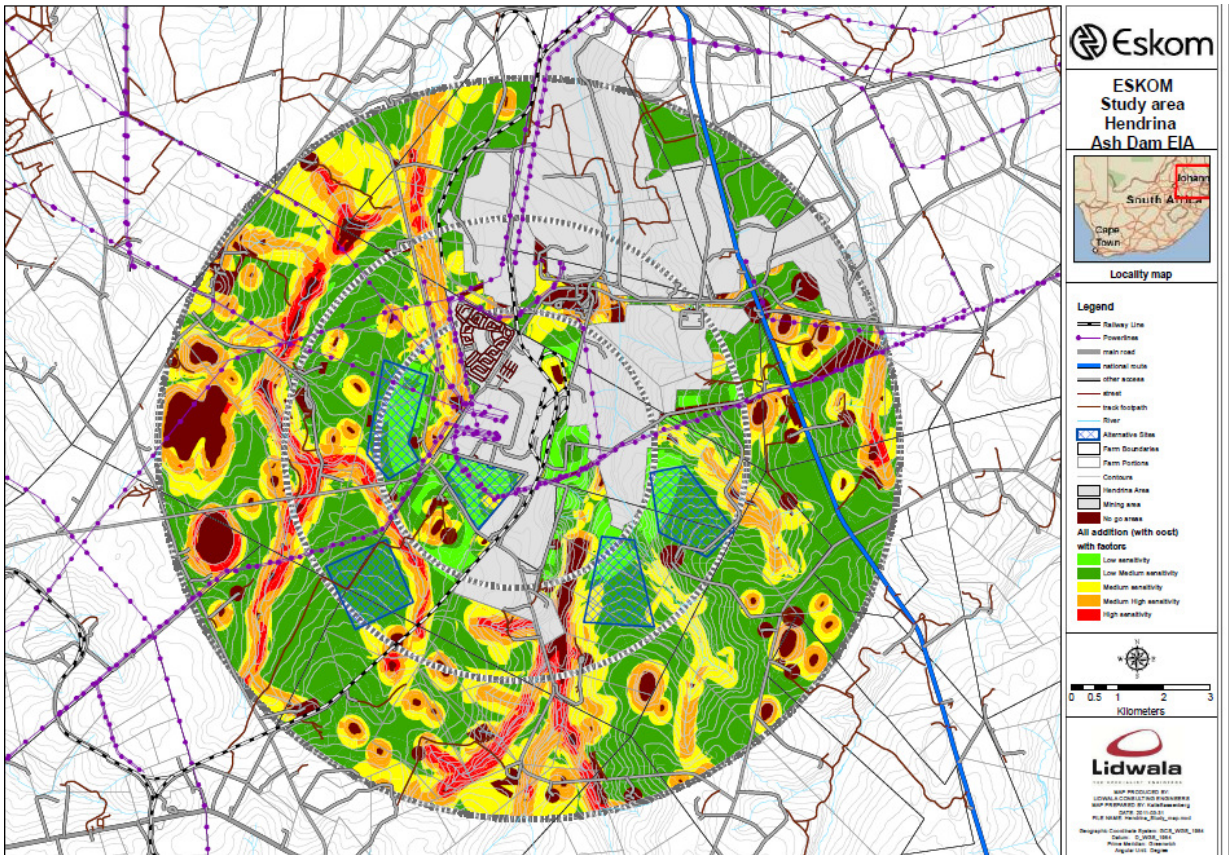

Figure 9.4: Recommended alternative sites (sensitivity map with the adjustment factors with cost)

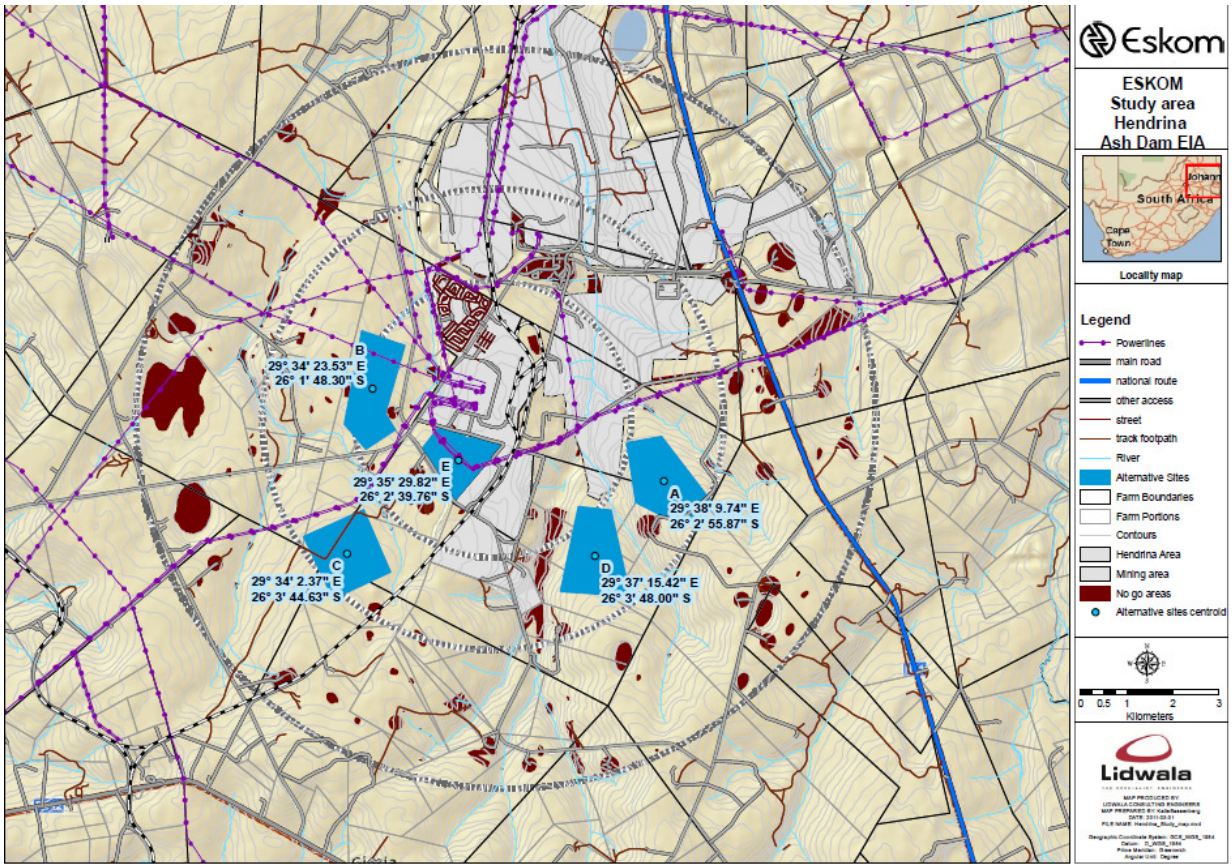

Figure 9.5: Five Alternative sites for further consideration during the Scoping Phase

In order to identify which of the five alternative sites are deemed preferred for further investigation during the EIA Phase, the specialists were requested to rank the alternatives sites according to a site ranking methodology.

The evaluation and nomination of a preferred site involves a highly interdisciplinary approach. The approach undertaken has involved a number of specialist studies which examine a number of different issues. In order to evaluate sites and determine a preferred site, the studies need to be comparative and therefore a site rating matrix was developed. The site preference rating system is applied to each discipline, and the rating of each site was conducted according to the following system:

1 = Not suitable for development / No-Go (impact of very high significance - negative)
2 = not preferred (impact of high significance - negative)
3 = acceptable (impact of moderate significance - negative)
4 = Preferred (impact of low or negligible significance - negative)

The final Site Ranking matrix is shown in **Table 9.1**.

Table 9.1: Final Site Ranking Matrix

Study	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Biodiversity	3	3	3	2	2
Avifauna	3	3	2	2	4
Surface Water	2	2	3	1	4
Ground water	2	3	4	2	2
Social	4	2	2	2	4
Visual	2	3	2	3	4
Design and Technical	2	3	2	2	4
Total	**18**	**19**	**18**	**14**	**24**

From the above preference rating results it is clear that Alternative E is by far the preferred site overall with Alternative B as the second most preferred site.

In addition to the screening process and the above site preference rating exercise (**Table 9.1**) the fatal flaws listed in the Minimum Requirements have also been taken into account in order to ensure that the most preferable site has been identified for further study in the EIA phase of this project. The Minimum Requirements require that no landfill / disposal site be developed in an area with an inherent fatal flaw. Through the fatal flaw discussion Alternatives A, B, and D could be eliminated (**Table 9.2**)

Table 9.2: Minimum Requirement Fatal Flaws

Fatal Flaw	Discussion	Site eliminated
Any area characterised by any factor that would prohibit the development of a landfill at prohibitive cost	The Eskom technical team deemed that any alternative located within a 8km radius of the power station could be deemed suitable in terms of cost. However, after ground truthing, the independent engineering input received noted that Site A is situated directly adjacent to Optimum Mine's open cast mining operation and Site D is just east of Total coal's Tumela Mine and on the "opposite" side of the open cast workings and a large dam to the existing power station facilities and is therefore considered too inaccessible. These two sites are therefore not considered technically feasible options without excessive expense.	Alternative A, C and D
Areas overlying viable mineral resource	Although this is not deemed a specific fatal flaw in terms of the minimum requirements – it could be linked to a couple of the above items specifically in terms of incompatible land uses. It is also Eskom's policy, where possible, to avoid sterilising viable mineral resources. The entire area is situated on coal resources, the exact viability of which we are unable to determine for certain at this stage. However, Alternative A and D are directly adjacent to both Optimum's and Total's opencast mining operations and are therefore anticipated to be on a viable resource. During a site visit (for ground truthing) it was noted that there are a number of mining right applications on the go within the study area, one particular application, for Kebrafield (Pty) Ltd (DMR Reference number: 30/5/1/2/2/479MR) is situated over a	Alternative A, B and D

	fairly large area to the west of the power station and includes all the farm portions included in the area identified for alternative B.	

The preferred sites identified from the site preference rating exercise (**Table 9.1**) include Alternative E and B. The above discussion (**Table 9.2**) with regards to the Minimum requirements fatal flaws excludes alternatives A, D and B for either being deem technically unfeasible (without excessive expense) or overlying viable coal resource.

Therefore, with the results of the two site selection discussions above only two sites are left for consideration as alternative sites for the proposed ash dam, i.e. Alternatives E and C.

The choice of a preferred site is required to take all aspects of the environment into account, social, biophysical, technical and economic aspects. Alternative C is deemed suitable from a cost perspective as it falls within the 8 km radius of the power station, from a technical point of view it can also be deemed suitable as apart from being a fair distance from site there are no major barriers (from a technical point of view) that would make the site unfeasible. The social study noted that Alternative C was situated close to a number of agricultural settlements and was also found to have the highest visual exposure of all 5 alternatives. From a biophysical point of view Alternative C is considered to be far less preferred than Alternative E as linear infrastructure required such as access roads, power lines and pipelines would be required to traverse at least 3 – 4 km from the power station to the site without the option of not crossing surface water features that were highlighted as higher sensitive areas by the surface water, biodiversity, avifauna and groundwater specialists during the screening phase.

The surface water system in question is a perennial system. Nel et al. (2004) lists a status of critically endangered for all the river signatures associated with the study area, which will include the surface water feature that would need to be crossed by linear infrastructure required for a new ash dam at alternative C. The ascribed river status indicates a limited amount of intact river systems carrying the same heterogeneity signatures nationally. This implies a severe loss in aquatic ecological functioning and aquatic diversity in similar river signatures on a national scale (Nel et al., 2004). Therefore, it is anticipated that the use of Alternative C as a preferred site would increase the risk of pollution and the associated environmental degradation of the system in question.

The above discussion clearly shows that Alternative C is not a recommended alternative. Alternative E due the additional impacts that would occur due to the construction and operation of the linear infrastructure required. Alternative E is considered more favourable due to its close proximity to the existing facilities and due to the fact that this alternative would be able to link in with many of the existing associated facilities therefore reducing the required footprint substantially. In terms of the cost mapping, Alternative E