17. CONCLUSIONS AND RECOMMENDATIONS

The Environmental Scoping Study for the proposed establishment of a new coal-fired power station in the Lephalale Area, Limpopo Province has been undertaken in accordance with the EIA Regulations published in Government Notice R1182 to R1184 of 5 September 1997, in terms of the Environment Conservation Act (No 73 of 1989), as well as the National Environmental Management Act (NEMA; No 107 of 1998).

The Environmental Scoping Study aimed to identify and evaluate potential environmental impacts associated with all aspects of the proposed project and nominate a preferred site for the establishment of the proposed new power station and ancillary infrastructure for detailed study within the Environmental Impact Assessment Phase. The conclusions and recommendations of this Scoping Study are the result of on-site inspections, evaluations of impacts identified by specialists, and the parallel process of public participation. The public consultation process has been extensive and every effort has been made to include representatives of all stakeholders in the study area.

In terms of the EIA Regulations, *feasible* alternatives have been considered within the Scoping Study.

The Environmental Scoping report evaluated four candidate sites identified as potentially feasible sites for the construction of the power station (terrace area) as well as a further four farms identified for investigation for the establishment of proposed ancillary infrastructure such as ashing facilities. The farms are as follows (see Figure 17.1):

- Power Station Sites:
  - Farm Appelvlakte 448 LQ
  - Farm Nelsonskop 464 LQ
  - Farm Naauwontkomen 509 LQ
  - Farm Eenzaamheid 687 LQ
- Ancillary infrastructure Sites:
  - Farm Droogeheuvel 447 LQ
  - Farm Zongezien 467 LQ
  - Farm Kuipersbult 511 LQ
  - Farm Kromdraai 609 LQ

The sites were evaluated in terms of their suitability for development in order to nominate a preferred site for the construction of the proposed power station and ancillary infrastructure. An overall evaluation of each site is provided below.

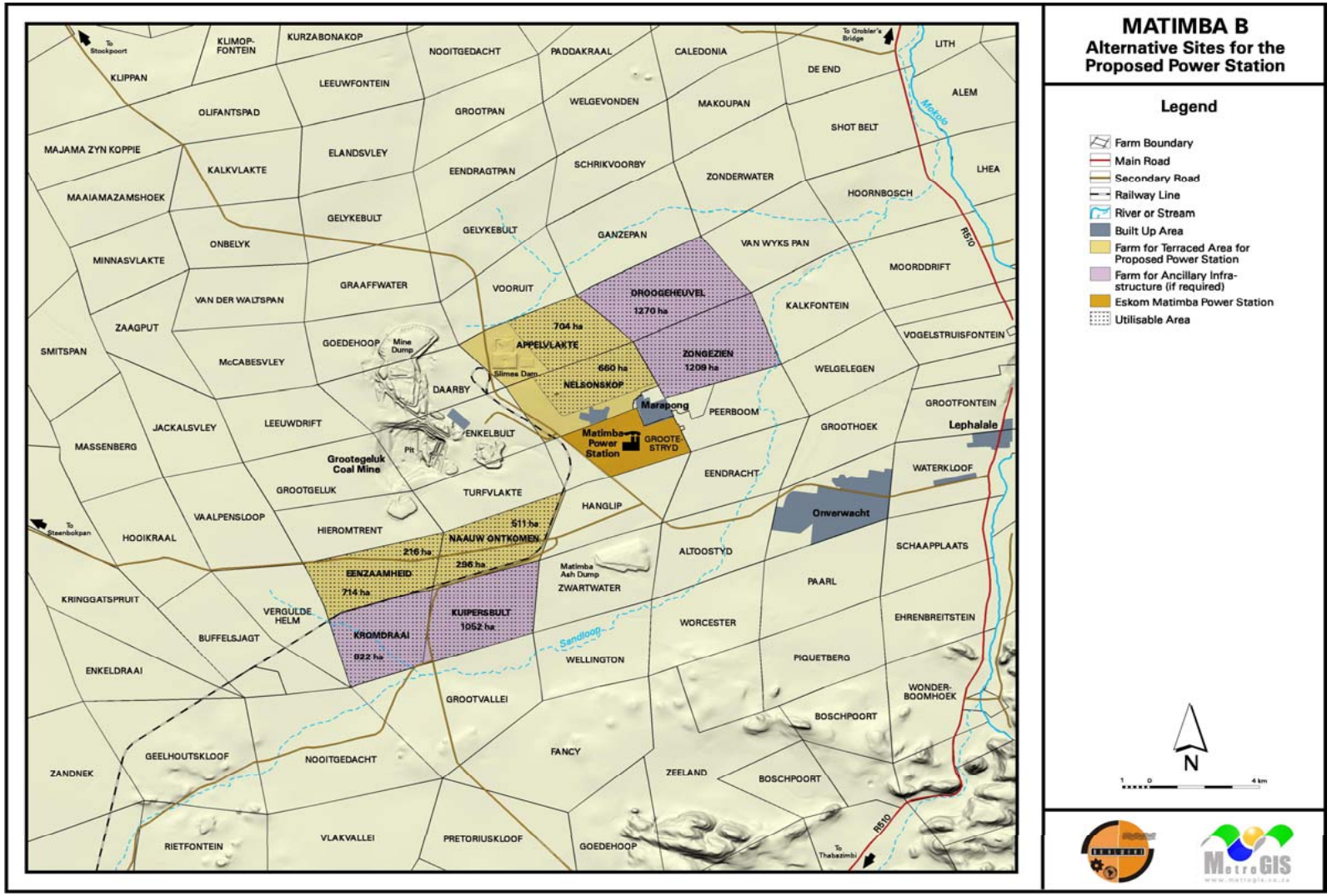

Figure 17.1: The locality of the eight alternative sites

17.1. Overall Evaluation of Alternative Sites

17.1.1. Farm Appelvlakte 448 LQ

The Farm Appelvlakte is situated to the north of the existing Matimba Power Station, and has an extent of 881,8 ha. The farm is owned by Kumba Resources, and currently forms part of the Ferroland Private Game Reserve which is a tourist destination for game viewing and hunting. The site lies ~ 4,3 km from the existing power station, ~ 3,8 km from the Marapong Township and ~ 9 km from Lephalale (Onverwacht Township). A portion of the farm is occupied by slimes dams operated by Kumba Resources.

The topography of the farm is flat with a north-eastern slope. The largest part of this farm falls within the Sweet Bushveld vegetation type, with only a small portion of the farm representing the Mixed Bushveld vegetation type. Both vegetation types are in good condition, and there is no excessive encroachment on the farm. No immediate over-utilisation was noted and the faunal assemblages that utilise these variations are expected to be diverse.

The farm's agricultural potential is considered to be medium, but the potential impact on the agricultural potential is considered to be low due to the sandy nature of the soils and their increased susceptibility to wind erosion. Clarens Formation sandstone underlies the farm. Some Minor faulting and three distinct aerial magnetic lineations have also been identified on this farm. The geotechnical conditions are considered acceptable for the establishment of the proposed power station.

The farm Appelvlakte has 12 boreholes varying between 52 m and 77 m in depth. The water yield ranges from 0,27 – 0,57 litres per second. 9 of the 12 boreholes are Grootegeluk monitoring or sampling boreholes. No surface water features of significance are located on the site. A tributary of the Sandloop River runs to the north of the northern boundary of the site.

From the specialist studies undertaken, a medium-low suitability for development has been attributed to the farm in terms of the construction of the power station and ancillary infrastructure. This is largely due to potential high impacts on human health and biodiversity as a result of the development of this site.

17.1.2. Farm Nelsonskop 464 LQ

Farm Nelsonskop is situated to the north of the existing Matimba Power Station, and has an extent of 848,2 ha. The farm is owned by Kumba Resources, and currently forms part of the Ferroland Private Game Reserve which is a tourist

destination for game viewing and hunting. A sewage works occupies a portion of the farm, but would not be affected should this site be selected for development.

The site lies ~ 2 km from the existing power station, ~ 1,2 km from the Marapong Township and ~ 7 km from Lephalale (Onverwacht Township). Possible social impacts could result with the development of this site from contact between the local residents and newcomers due to the proximity of the site to the Marapong township. The proximity to Marapong is also important from a noise and air emissions perspective due to the potentially high impacts associated with the new power station in this regard.

Both the Sweet Bushveld and Mixed Bushveld vegetation types are represented on the farm. Although largely similar to the vegetation of Appelvlakte, the distribution of these variations is more distinct as a result of smaller ecotonal areas caused by greater variation in environmental attributes. Historic agricultural practices have resulted in degradation of the vegetation in the southern part of the farm. However, in spite of these impacts, the ecological sensitivity of this farm is considered high, mainly as a result of the presence of the Nelsonskop outcrop, but also as a result of the presence of various well-developed and distinct habitats and the high connectivity to large untransformed areas, providing sink habitats for many faunal species.

A small hill on Nelsonskop revealed some interesting engravings of animal spoors, cupules and cut marks on the southern face of the outcrop. A number of small stone-walled enclosures were also found on the top of the hill. This hill is in all probability a site of potency for the making of rain by the San and later Sotho-Tswana speaking people in the area. The site is considered to be of high significance from a heritage perspective.

The agricultural potential on this farm is considered to be medium, but the potential impact on the agricultural potential is considered to be low due to the sandy nature of the soils and their increased susceptibility to wind erosion. A small portion of this farm has high agricultural potential soils, however, the significance is still considered to be low as the climatic conditions in the area are not suited to rain-fed arable cultivation. Clarens Formation sandstone underlies the majority of the site. Minor faulting and magnetic lineations have been identified across the farm. The geotechnical conditions are considered acceptable for the establishment of the power station.

The Farm Nelsonskop has 8 boreholes varying between 76 m and 500 m in depth. The water yield from these boreholes ranges between 0,32 and 0,85 litres per second. 2 of these boreholes are Eskom monitoring boreholes and 3 are Kumba Resources monitoring boreholes. No surface water features of significance are located on the site.

A low suitability for development is attributed to this property as a result of the presence of sensitive habitat types, heritage sites and the close proximity of the site to the Marapong township.

17.1.3. Farm Naauwontkomen 509 LQ

The Farm Naauwontkomen is situated to the south-west of the existing Matimba Power Station, and has an extent of 883,4 ha. The farm is owned by Kumba Resources (Grootegeluk Mine), and is currently utilised in a breeding programme.

The site is traversed by the Steenbokpan road and a railway line runs along the eastern and southern boundaries. Although the farm is easily accessible, the need to realign the Steenbokpan Road will elevate the transport costs.

The site lies ~ 4 km from the existing power station, ~ 5,2 km from the Marapong Township and ~ 8,5 km from Lephalale (Onverwacht Township). Development on this farm will potentially impact on the residents of the neighbouring farm Hangklip.

The vegetation on this farm conforms to the diverse nature of the Mixed Bushveld vegetation type. Several historic impacts have occurred that have influenced the current status of the vegetation, the most significant being the clearing of vegetation in the western, southern and eastern parts. As a result of these impacts the ecological elements on this farm are considered to be of low sensitivity.

The agricultural potential on this farm is considered to be medium, but the potential impact on the agricultural potential is considered to be low due to the sandy nature of the soils and their increased susceptibility to wind erosion. A small portion of this farm has high agricultural potential soils, however, the significance is considered to be low as the climatic conditions in the area are not suited to rain-fed arable cultivation. Sandstone of the Mogalakwena Formation underlies the majority of this farm. The Eenzaamheid Fault strikes east - west across the site, some 250 m south of the northwest border to 1,25 km south of the northeast border. A north-south striking fault, joining the Daarby and Eenzaamheid faults, also extends onto the farm. The geotechnical conditions are considered acceptable for the establishment of the power station.

The farm Naauwontkomen has 10 boreholes on the property varying from 4 m to 100 m in depth. The water yield varies between 0,06 and 0,98 litres per second. Three of these boreholes are Kumba Resources monitoring boreholes. No surface water features of significance are located on the site.

A high suitability for the proposed development is attributed to this property, due to the low ecological sensitivity and limited impact on the social environment.

17.1.4. Farm Eenzaamheid 687 LQ

The Farm Eenzaamheid is situated to the south-west of the existing Matimba Power Station, and has an extent of 936,5 ha. The farm is privately owned and is currently used for cattle farming. A railway line forms the southern boundary of farm. The site is traversed by the Steenbokpan Road. Although the site is easily accessible, the need to realign the Steenbokpan road will increase transport costs.

Development on this site will potentially impact the surrounding farms and farming activities, Vergulde, Buffelsjagt, Hooikraal and Massenberg. The farm Massenberg is a game farm which frequently houses overseas hunters. The site lies ~ 11 km from the existing power station, ~ 12 km from the Marapong Township and ~ 15 km from Lephalale (Onverwacht Township).

An informal cemetery with four graves was found on the farm Vergulde Helm 316 LQ directly west of the farm. Two of the graves date back to the 1930. The other two are fairly recent. This site is considered to be of low significance.

The farm Eenzaamheid is located with the Mixed Bushveld vegetation type. The farm is divided into a smaller northern and larger southern section by the Steenbokpan road running in an east-west direction, resulting in a relatively fragmented habitat. The vegetation on the farm is currently in a poor condition as a result of intensive grazing activities. There is potential to improve the state of the vegetation by addressing issues such as carrying capacity and stocking rates as well as the implementation of a fire management strategy. However, the existing floristic and faunal sensitivity is considered to be low.

The agricultural potential on this farm is considered to be medium, but the potential impact on the agricultural potential is considered to be low due to the sandy nature of the soils and their increased susceptibility to wind erosion. Waterberg Group sediments underlie the majority of this site. The Eenzaamheid fault is located ± 250 m from the northern border of the farm. Shallow coal is present to the north of the Eenzaamheid fault. This coal reserve will be sterilised as a result of the establishment of the power station on this farm. This will have a potential economic impact The geotechnical conditions are considered acceptable for the establishment of the power station.

Four boreholes are located on this site. These boreholes vary in depth between 75 m and 400 m. The water yield varies between 0,03 and 0,25 litres per

second. In terms of groundwater resources impacts, the Farm Eenzaamheid is considered preferable for the construction of the power station. No surface water features of significance are located on the site.

The suitability of this farm for the proposed power station and ancillary infrastructure is considered to be medium-high. The degraded nature of the vegetation with low variation, contributes to the suitability of this property for the proposed development.

17.1.5. Farm Droogeheuvel 447 LQ

Farm Droogeheuvel is situated to the north-east of the existing Matimba Power Station, and adjacent to the Farm Appelvlakte. The farm is ~ 1 270 ha in extent. The farm is privately owned. The landowner operates a lodge on the property. Development on this site will potentially impact the neighbouring game farms, namely, Schrikvoorby, Welgevonden and Ganzepan.

The topography of this site is generally flat, sloping slightly in an eastern direction. The vegetation on this farm is represented by the Sweet Bushveld vegetation type. Extensive areas of the farm have been manipulated due to the intensive nature of farming practices in the past. The degraded status of the vegetation does not extend to the entire farm and parts of the farm are considered to be in a good condition. The faunal and floristic sensitivity of the farm is considered to the medium.

The agricultural potential on this farm is considered to be medium, but the potential impact on the agricultural potential is considered to be low due to the sandy nature of the soils and their increased susceptibility to wind erosion. Clarens Formation sandstone underlies the farm. Minor faulting has been identified on this farm.

The Farm Droogeheuvel has 9 boreholes varying from 49 m to 400 m in depth. The water yield varies between 0,21 and 0,64 litres per second. No surface water features of significance are located on the site.

The suitability of the property for the proposed development is considered to be medium. Although the habitat on the site is considered degraded in parts and no other aspects of particular concern were observed, the ecological status of the farms surrounding the property is considered high and the connectivity of the general area is not compromised. The medium suitability of the farm Droogeheuvel is also as a result of its close proximity to the farm Nelsonskop which is considered sensitive due to the presence of sensitive habitat types and heritage sites

17.1.6. Farm Zongezien 467 LQ

Farm Zongezien is situated to the north-east of the existing Matimba Power Station, and adjacent to the Farm Nelsonskop. The farm is owned by Eskom and is currently utilised as a hunting farm. A new lodge is currently being built on the farm. Development on this site could impact on the livelihood of the farms Peerboom, Eendracht, Fancy and Kalkfontein. Possible social impacts could result with the development of this site from contact between the local resident and newcomers due to the proximity of the site to the Marapong township. The proximity to Marapong is also important from a noise and air emissions perspective due to the possible impacts associated with the ancillary infrastructure in this regard.

The topography of this site is relatively flat, with slight undulations. The vegetation on this farm is represented by both the Mixed Bushveld and the Sweet Bushveld vegetation types. A lowland is present in the central part of the farm, forming an informal drainage line. The vegetation is considered to be in a good condition and appropriate grazing practices are applied.

The agricultural potential on this farm is considered to be medium, but the potential impact on the agricultural potential is considered to be low due to the sandy nature of the soils and their increased susceptibility to wind erosion. Clarens Formation sandstone underlies the northern portion of the farm. The Daarby fault strikes across the centre of the farm. Swartrant Formation sandstone outcrops to the south of the Daarby Fault.

The Farm Zongezien has 6 boeholes varying from 64 m to 60 m in depth. The water yield of these boreholes varies between 0,05 and 0,79 litres per second. No surface water features of significance are located on the site. A tributary of the Sandloop River flows past the south-eastern corner of the site.

A medium-low suitability for development is attributed to this property as a result of the well-preserved status of the habitat as well as its close proximity to the farm Nelsonskop and the Marapong Township. The farm Nelsonskop is considered sensitive due to the presence of sensitive habitat types and heritage sites.

17.1.7. Farm Kuipersbult 511 LQ

The farm Kuipersbult is situated to the south of the existing Matimba Power Station, and adjacent to the farm Naauwontkomen. The farm is privately owned. The farm is ~ 1 052 ha in extent.

Two heritage sites were recorded on the farm, i.e. a single grave from 1953 and a small outcrop with a few small pieces of non-diagnostic iron age pottery. The latter site could have served as a rainmaking site however, no engravings or other artefacts were found. These sites are considered to have a high heritage significance.

The topography of this site is flat, gently sloping towards the south-east. The vegetation on this farm is represented by the Mixed Bushveld vegetation type as well as the Waterberg Moist Mountain Bushveld vegetation type. Numerous habitat variations were noted and are attributed to the underlying soil patterns. Extremely high utilisation has resulted in a degraded appearance of the habitat. The floristic and faunal sensitivity is condiered to be medium-high due to the numerous habitat variations and the perception that the degradation could be improved.

The agricultural potential on this farm is considered to be medium, but the potential impact on the agricultural potential is considered to be low due to the sandy nature of the soils and their increased susceptibility to wind erosion. Sandstone of the Mogalakwena Formation underlies the farm. A minor east-west striking fault is mapped within the centre of the farm.

The farm Kuipersbult has 9 boreholes varying between 15 m and 153 m in depth. The water yield for these boreholes varies between 0,01 and 0,33 litres per second, however one borehole has a water yield of 3,2 litres per second, this boreholes is thought to be associated with a fault. No surface water features of significance are located on the site.

In spite of the degraded status of the habitat on this property, a medium-low suitability for the proposed development is attributed to this property due to the presence of significant heritage sites.

17.1.8. Farm Kromdraai 690 LQ

The farm Kromdraai is situated to the south-west of the existing Matimba Power Station, and adjacent to the farm Eenzaamheid. The farm is privately owned. The farm is ~ 922 ha in extent.

The topography of this site is flat. The vegetation on this farm is represented by the Mixed Bushveld vegetation type. The ecological sensitivity of this site is considered high due to the fact the vegetation on this property represents a prime example of the regional vegetation and no significant human impacts are evident. In terms of floristic diversity, major variations are present and this farm is also highly connected to large untransformed areas, providing excellent sink habitats for many faunal species.

The agricultural potential on this farm is considered to be medium, but the potential impact on the agricultural potential is considered to be low due to the sandy nature of the soils and their increased susceptibility to wind erosion. Waterberg Group sediments underlie the entire site. A minor fault, recognised on Kuipersbult, extends into the eastern boundary of this farm.

The farm Kromdraai has 4 boreholes, varying between 7 m and 400 m in depth. The water yield varies between 0,02 and 0,85 litres per second.

In terms of the impacts on groundwater resources, the Farm Kromdraai is considered preferable for the establishment of ancillary infrastructure, as there is a strong yielding borehole associated with a fault on the farm. A small tributary of the Sandloop drains Kromdraai. This surface water channel would be required to be diverted with the development of the site.

A medium-low suitability for the proposed development is attributed to this property as the general habitat is in a relatively good condition. The presence of numerous and diverse variations necessitates the conservation of this farm. In addition, potential impacts associated with the diversion of the tributary of the Sandloop reduce the suitability of this site for development.

17.1.9. Conclusions

In terms of the studies undertaken by the specialists, the farms Naauwontkomen 509 LQ and Eenzaamhied 687 LQ can be considered to be the most suitable for the development of the power station and/or ancillary infrastructure.

In order to confirm the result of the environmental evaluation, the identified alternative sites were weighted against one another using a comparative mathematical model. The objective of the model is to calculate a comparative percentage-based score, built on mathematical formulas reliant on a set of environmental issues (characteristics) which have been identified for a hypothesis test. The mathematical formulas have been set-up to ensure that the existence of more potential impacts for one alternative than the other is not biased in favour of the option which contains more variables. To ensure a uniform score between the alternative site models, the model assumes a defined set of environmental issues that apply to all options subjected to the model. These environmental issues are ranked in order of importance, relevant to the project. Potential impacts are defined for each of the environmental issues. However, in some instances, one alternative may have more potential impacts than the other options for a particular environmental issue. It is in these situations that the model calculates a comparative percentage score as one site cannot be unfairly biased if it has less impact than another site. The end result produces a

percentage score that is used to rank various site alternatives. The option with the highest percentage score is considered to be the most favourable alternative. The score does not reflect the environmental acceptability of the development, i.e. there is no pass or fail percentage. The scores are required to be read in relation to one another.

The matrix confirms the conclusion that the farms Naauwontkomen 509 LQ and Eenzaamhied 687 LQ are considered to be the preferred sites for the development of the power station and/or ancillary infrastructure (refer to Appendix R).

17.2. Evaluation in terms of Economic and Technical Criteria

In order to provide a balanced approach to the site selection process, economic and technical criteria which play a role in the selection of a site have been included within the overall evaluation of the candidate sites. The issues raised for consideration are as follows:

- Wind effects – the suitability of a site in terms of the potential impacts of the dominant wind direction and the potential for elevated ambient temperatures.
- Distance of coal conveyor system – from the coal supplier to the power station.
- Distance of ash conveyor system – from the power station to the ash disposal site.
- The cost of relocating existing infrastructure on sites – the cost of moving infrastructure, for example the cost of constructing a road bypass on the Steenbokpan Road at Naauwontkomen.
- Consideration of geotechnical conditions and the potential issues with regards to founding conditions.

The relative ratings for each of these issues is included in Appendix R.

In order to evaluate the sites in terms of environmental and technical/economic factors, the alternative sites were weighted against one another taking the identified environmental and technical issues into consideration. This data was used in a combined mathematical model (refer to in Appendix R) in order to produce a percentage score. This score therefore ranks the alternative sites in terms of environmental and technical/economic factors, and the option with the highest percentage is considered to be the most favourable alternative.

In terms of this matrix, the farms Naauwontkomen 509 LQ and Eenzaamheid 687 LQ are considered to be the preferred sites for the proposed power station and/or ancillary infrastructure (see Figure 17.2).

17.3. Overall Conclusion and Recommendation

Based on the specialist studies no environmental fatal flaws have been identified as a result of the proposed project, although a number of potentially significant environmental impacts have been identified as requiring further in-depth study. Therefore, an EIA is required to be undertaken in order to provide an assessment of these potential impacts and recommend appropriate mitigation measures, where required. This EIA must be undertaken for the preferred sites, namely, the farms Naauwontkomen 509 LQ and Eenzaamheid 687 LQ (see Figure 17.2).

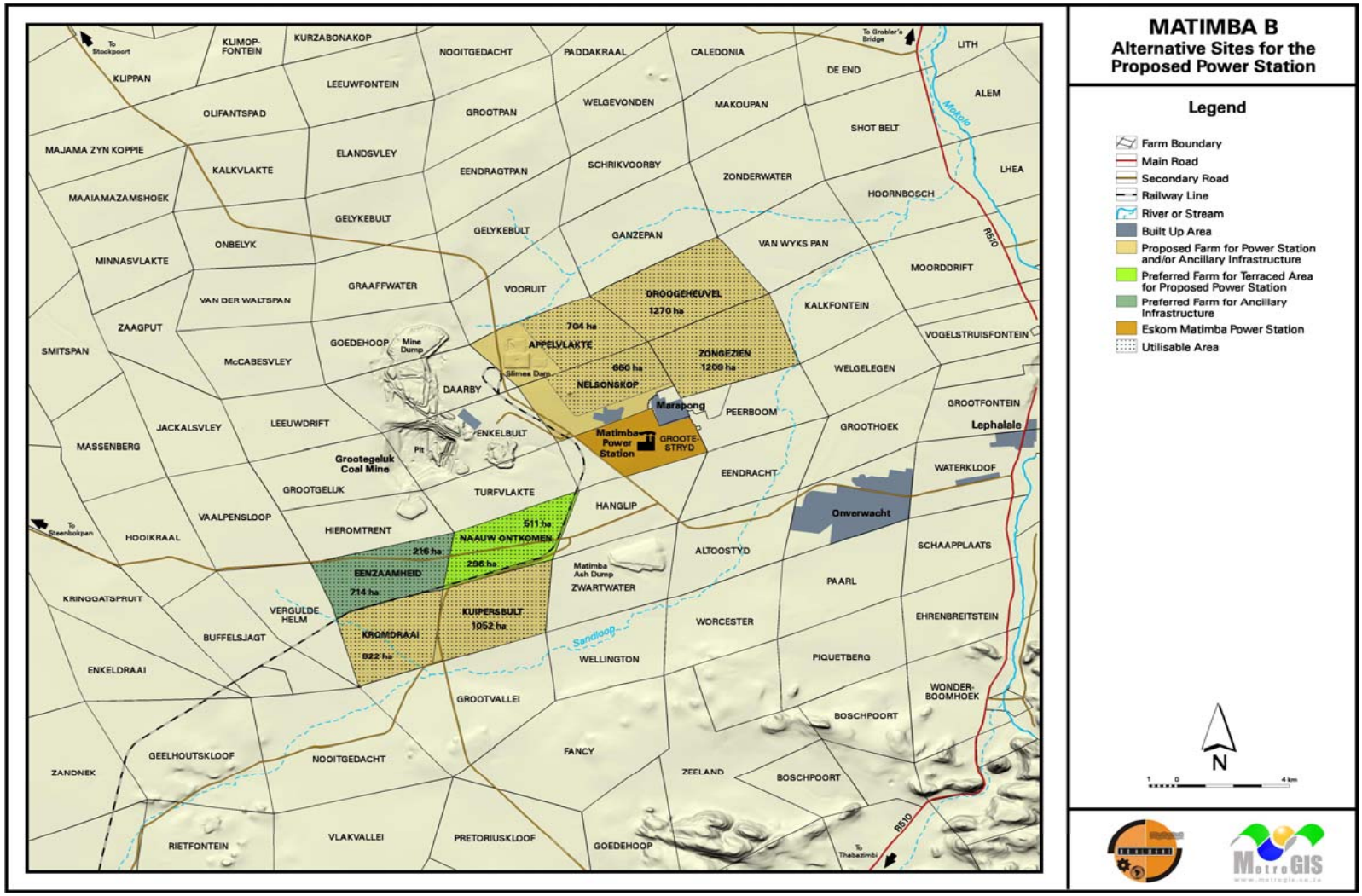

Figure 17.2: The farms Naauwontkomen 509 LQ and Eenzaamheid 687 LQ are considered to be the preferred sites for the proposed power station and/or ancillary infrastructure